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FILE 'REGISTRY' ENTERED AT 15:31:31 ON 30 APR 2007  
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DICTIONARY FILE UPDATES: 29 APR 2007 HIGHEST RN 933681-85-7

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=> d his nofile

(FILE 'HOME' ENTERED AT 13:42:52 ON 30 APR 2007)

FILE 'HCAPLUS' ENTERED AT 13:43:01 ON 30 APR 2007

L1 1 SEA ABB=ON PLU=ON US2004137330/PN

FILE 'REGISTRY' ENTERED AT 13:44:03 ON 30 APR 2007

L2 7 SEA ABB=ON PLU=ON (10377-52-3/BI OR 150499-39-1/BI OR  
7439-93-2/BI OR 7440-01-9/BI OR 7440-37-1/BI OR 7440-59-7  
/BI OR 7704-34-9/BI)

D SCA

L3 1 SEA ABB=ON PLU=ON 7439-93-2/RN

L4 9735 SEA ABB=ON PLU=ON (LI(L)P(L)O)/ELS

L5 20 SEA ABB=ON PLU=ON L4 (L) 3/ELC.SUB

L6 7146 SEA ABB=ON PLU=ON L4 (L)H/ELS

L7 105 SEA ABB=ON PLU=ON L6 (L)4/ELC.SUB

L8 3387 SEA ABB=ON PLU=ON L4 (L) N/ELS

L9 69 SEA ABB=ON PLU=ON L8 (L) 4/ELC.SUB

FILE 'HCAPLUS' ENTERED AT 15:07:11 ON 30 APR 2007

L10 4878 SEA ABB=ON PLU=ON L3(L)METAL?

L11 QUE ABB=ON PLU=ON (LITHIUM OR LI) (3A)METAL?

L12 QUE ABB=ON PLU=ON LAYER? OR OVERLAY?

L13 QUE ABB=ON PLU=ON PRETREAT? OR PRE(W)TREAT?

L14 773 SEA ABB=ON PLU=ON L13(3A)L12

L15 QUE ABB=ON PLU=ON THICK?

L16 97288 SEA ABB=ON PLU=ON L15(3A) (10 OR 20 OR 30 OR 40 OR 50  
OR 60 OR 4000 OR 5000 OR 6000)

L17 QUE ABB=ON PLU=ON CONDUCT?

L18 28790 SEA ABB=ON PLU=ON L17(3A) (5 OR 10 OR 15)

L19 QUE ABB=ON PLU=ON PROTECT?(3A)L12

L20 2 SEA ABB=ON PLU=ON (L10 OR L11) AND L14

L21 2018 SEA ABB=ON PLU=ON (L10 OR L11) AND L12  
L22 2011 SEA ABB=ON PLU=ON L5 OR L7  
L23 180 SEA ABB=ON PLU=ON L9  
L24 382 SEA ABB=ON PLU=ON L21 AND (L17 OR L22)  
L25 33 SEA ABB=ON PLU=ON L24 AND (L19 OR L23)  
L26 2 SEA ABB=ON PLU=ON L25 AND L16  
L27 2 SEA ABB=ON PLU=ON L25 AND L18  
L28 4 SEA ABB=ON PLU=ON L20 OR L26 OR L27  
L29 30 SEA ABB=ON PLU=ON L25 NOT L28  
L30 23 SEA ABB=ON PLU=ON L29 AND (1907-2002)/PY,PRY,AY

=> fil hcap

FILE 'HCAPLUS' ENTERED AT 15:31:42 ON 30 APR 2007

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FILE COVERS 1907 - 30 Apr 2007 VOL 146 ISS 19

FILE LAST UPDATED: 29 Apr 2007 (20070429/ED)

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This file contains CAS Registry Numbers for easy and accurate substance identification.

=> d l28 ibib abs hitstr hitind 1-4

L28 ANSWER 1 OF 4 HCAPLUS COPYRIGHT 2007 ACS on STN  
ACCESSION NUMBER: 2006:269693 HCAPLUS Full-text  
DOCUMENT NUMBER: 144:295967  
TITLE: Metal-air battery with ion-conducting  
inorganic glass electrolyte  
INVENTOR(S): Jang, Bor Z.  
PATENT ASSIGNEE(S): USA  
SOURCE: U.S. Pat. Appl. Publ., 9 pp..  
CODEN: USXXCO  
DOCUMENT TYPE: Patent  
LANGUAGE: English  
FAMILY ACC. NUM. COUNT: 1  
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2006063051	A1	20060323	US 2004-944667	20040920

PRIORITY APPLN. INFO.:

US 2004-944667

200409

20

AB The invention concerns a solid-state metal-air electrochem. cell comprising: (a) a metal-containing electroactive anode; (b) an oxygen electroactive cathode; and (c) an ion-conducting glass electrolyte disposed between the metal-containing anode and the oxygen electroactive cathode. The cathode active material, which is oxygen gas, is not stored in the battery but rather fed from the environment. The oxygen cathode is preferably a composite carbon electrode which serves as the cathode current collector on which oxygen mols. are reduced during discharge of the battery to generate elec. current. The glass electrolyte typically has an ion conductivity in the range of  $5 \times 10^{-5}$  to  $2 \times 10^{-3}$  S/cm. The electrolyte layer is preferably smaller than 10  $\mu\text{m}$  in thickness and further preferably smaller than 1  $\mu\text{m}$ . The anode metal is preferably lithium or lithium alloy, but may be selected from other elements such as sodium, magnesium, calcium, aluminum and zinc.

IT 7439-93-2, Lithium, uses 10377-52-3, Lithium phosphate 184905-46-2, Lithium nitrogen phosphorus oxide  
 RL: DEV (Device component use); USES (Uses)  
 (metal-air battery with ion-conducting inorg. glass electrolyte)

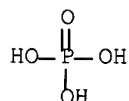
RN 7439-93-2 HCAPLUS

CN Lithium (CA INDEX NAME)

Li

RN 10377-52-3 HCAPLUS

CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li

RN 184905-46-2 HCAPLUS

CN Lithium nitrogen phosphorus oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
N	x	17778-88-0
O	x	17778-80-2
P	x	7723-14-0
Li	x	7439-93-2

INCL 429029000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 57

ST battery ion conducting inorg glass electrolyte

IT Alloys, uses

RL: DEV (Device component use); USES (Uses)

- (alkaline earth; metal-air battery with ion-conducting inorg. glass electrolyte)
- IT Alkaline earth metals
  - RL: DEV (Device component use); USES (Uses)
  - (alloys; metal-air battery with ion-conducting inorg. glass electrolyte)
- IT Vapor deposition process
  - (chemical; metal-air battery with ion-conducting inorg. glass electrolyte)
- IT Glass, uses
  - RL: DEV (Device component use); USES (Uses)
  - (electrolyte; metal-air battery with ion-conducting inorg. glass electrolyte)
- IT Borate glasses
  - RL: DEV (Device component use); USES (Uses)
  - (lithium borate; metal-air battery with ion-conducting inorg. glass electrolyte)
- IT Phosphate glasses
  - RL: DEV (Device component use); USES (Uses)
  - (lithium phosphate; metal-air battery with ion-conducting inorg. glass electrolyte)
- IT Silicate glasses
  - RL: DEV (Device component use); USES (Uses)
  - (lithium silicate; metal-air battery with ion-conducting inorg. glass electrolyte)
- IT Glass, uses
  - RL: DEV (Device component use); USES (Uses)
  - (lithium silicon borate sulfide; metal-air battery with ion-conducting inorg. glass electrolyte)
- IT Glass, uses
  - RL: DEV (Device component use); USES (Uses)
  - (lithium silicon oxide phosphate sulfide; metal-air battery with ion-conducting inorg. glass electrolyte)
- IT Glass, uses
  - RL: DEV (Device component use); USES (Uses)
  - (lithium silicon phosphate sulfide; metal-air battery with ion-conducting inorg. glass electrolyte)
- IT Glass, uses
  - RL: DEV (Device component use); USES (Uses)
  - (lithium silicon silicate sulfide; metal-air battery with ion-conducting inorg. glass electrolyte)
- IT Battery electrolytes
  - Ionic conductivity
  - Laser ablation
  - Primary batteries
  - Sputtering
    - (metal-air battery with ion-conducting inorg. glass electrolyte)
- IT Alkaline earth metals
  - Carbonaceous materials (technological products)
  - RL: DEV (Device component use); USES (Uses)
  - (metal-air battery with ion-conducting inorg. glass electrolyte)
- IT Vapor deposition process
  - (phys.; metal-air battery with ion-conducting inorg. glass electrolyte)
- IT Vapor deposition process
  - (plasma; metal-air battery with ion-conducting inorg. glass electrolyte)
- IT Evaporation



- (vacuum; metal-air battery with ion-conducting inorg. glass electrolyte)
- IT **Lithium** alloy, base  
RL: DEV (Device component use); USES (Uses)  
(metal-air battery with ion-conducting inorg. glass electrolyte)
- IT 12136-58-2, **Lithium** sulfide (Li<sub>2</sub>S) 13759-10-9, Silicon sulfide (SiS<sub>2</sub>)  
RL: DEV (Device component use); USES (Uses)  
(glass; metal-air battery with ion-conducting inorg. glass electrolyte)
- IT 3277-26-7, 1,1,3,3-Tetramethyldisiloxane  
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)  
(metal-air battery with ion-conducting inorg. glass electrolyte)
- IT 7429-90-5, Aluminum, uses 7439-89-6, Iron, uses **7439-93-2**, **Lithium**, uses 7439-95-4, Magnesium, uses 7439-96-5, Manganese, uses 7440-02-0, Nickel, uses 7440-09-7, Potassium, uses 7440-17-7, Rubidium, uses 7440-23-5, Sodium, uses 7440-24-6, Strontium, uses 7440-32-6, Titanium, uses 7440-39-3, Barium, uses 7440-41-7, Beryllium, uses 7440-44-0, Carbon, uses 7440-46-2, Cesium, uses 7440-47-3, Chromium, uses 7440-66-6, Zinc, uses 7440-70-2, Calcium, uses **10377-52-3**, **Lithium** phosphate 11102-77-5 12627-14-4, **Lithium** silicate 12676-27-6 12798-95-7 37186-88-2 37220-89-6, **Lithium** aluminate 39300-27-1 53680-59-4 65777-94-8 **184905-46-2**, **Lithium** nitrogen phosphorus oxide 236388-73-1, **Lithium** silicide sulfide 236388-75-3, Aluminum **lithium** sulfide 236388-76-4, **Lithium** phosphide sulfide  
RL: DEV (Device component use); USES (Uses)  
(metal-air battery with ion-conducting inorg. glass electrolyte)
- IT 178958-56-0P, **Lithium** silicon oxide  
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
(metal-air battery with ion-conducting inorg. glass electrolyte)

L28 ANSWER 2 OF 4 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 2004:878025 HCAPLUS Full-text

DOCUMENT NUMBER: 141:368410

TITLE: Method of preparation of anode for lithium battery

INVENTOR(S): Lee, Jong-Ki; Lee, Jea-Woan; Cho, Chung-Kun; Lee, Sang-Mock

PATENT ASSIGNEE(S): Samsung SDI Co., Ltd., S. Korea

SOURCE: U.S. Pat. Appl. Publ., 8 pp.

CODEN: USXXCO

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2004209159	A1	20041021	US 2004-820762	

200404

KR 2004090561	A	20041026	KR 2003-24427	09
				200304
				17
JP 2004319489	A	20041111	JP 2004-116658	200404
				12
CN 1571187	A	20050126	CN 2004-10071491	200404
				17
PRIORITY APPLN. INFO.:		KR 2003-24427	A	200304
				17

AB A neg. electrode of a lithium battery includes a **lithium metal** and a **protective layer** that includes a material having an ion **conductivity** of at least 5.times.10<sup>-5</sup> S/cm. The **protective layer** includes ion **conductive** material that has a dense internal structure and an effective adhesive strength to the **lithium metal**. Although the **protective layer** has a thickness in the order of micrometers, the **protective layer** does not cause resistance to the electrochem. reaction and is chemical stable with respect to both the **lithium metal** and the electrolyte.

IC ICM H01M002-16  
ICS H01M004-40; B05D005-12

INCL 429137000; X42-924.6; X42-923.195; X42-712.3

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

IT Battery anodes  
Electron beam evaporation  
Ion beam sputtering  
Ionic **conductivity**  
Laser ablation  
Sputtering  
(method of preparation of anode for lithium battery)

IT Nitrides  
Oxides (inorganic), uses  
Oxynitrides  
Sulfides, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(**protective layer**; method of preparation of anode for lithium battery)

IT 12015-64-4, Lithium chloride nitride (Li9Cl3N2) 14024-11-4, Lithium tetrachloroaluminate 26134-62-3, Lithium nitride (Li3N) 73071-42-8, Lithium iodide nitride (Li10IN3) 778589-21-2, Lithium sodium chloride nitride ((Li,Na)9Cl3N2) 778589-22-3, Lithium potassium chloride nitride ((Li,K)9Cl3N2) 778589-23-4, Lithium rubidium chloride nitride ((Li,Rb)9Cl3N2) 778589-24-5, Cesium lithium chloride nitride ((Cs,Li)9Cl3N2) 778589-25-6, Lithium sodium iodide nitride (Li9NaIN3) 778589-26-7, Lithium potassium iodide nitride (Li9KIN3) 778589-27-8, Lithium rubidium iodide nitride (Li9RbIN3)  
RL: TEM (Technical or engineered material use); USES (Uses)  
(**protective layer**; method of preparation of anode for lithium battery)

L28 ANSWER 3 OF 4 HCAPLUS COPYRIGHT 2007 ACS on STN  
ACCESSION NUMBER: 2004:391728 HCAPLUS Full-text  
DOCUMENT NUMBER: 140:378090  
TITLE: Anodes for lithium-sulfur batteries, their manufacture, and lithium-sulfur batteries using them

INVENTOR(S): Lee, Jong Ki; Lee, Je Won; Cho, Joung Keun; Lee, Sang Muk; Kim, Min Hyup  
 PATENT ASSIGNEE(S): Samsung SDI Co., Ltd., S. Korea  
 SOURCE: Jpn. Kokai Tokkyo Koho, 9 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO. -----	KIND ----	DATE -----	APPLICATION NO. -----	DATE
JP 2004139968	A	20040513	JP 2003-276606	20030718
KR 2004035100	A	20040429	KR 2002-63834	20021018
US 2004137330	A1	20040715	US 2003-688781	20031017
CN 1508893	A	20040630	CN 2003-10123734	20031018
PRIORITY APPLN. INFO.:			KR 2002-63834	A 20021018

AB The anodes for lithium-sulfur batteries are manufactured by forming a **pretreatment layer** (thickness 50 -5000 Å) containing Li+-**conductive** substances having ionic conductivity  $\geq 1 + 10^{-10}$  S/cm on Li metal by vapor deposition under inert gas atmospheric and forming a Li metal-protective film by vapor deposition. Preferably, the Li+-**conductive** substance may be Li<sub>3</sub>PO<sub>4</sub> and the **protective layer** contains Li<sub>2.9</sub>PO<sub>3.3</sub>N<sub>0.46</sub>. Lithium-sulfur batteries contain the anodes above and cathodes containing cathode active materials selected from S element, S-series compds., and their mixts. The anode **pretreatment layer** shows high ionic cond . and no volume expansion.

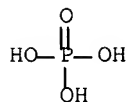
IT 7439-93-2, Lithium, uses  
 RL: DEV (Device component use); USES (Uses)  
 (manufacture of lithium-sulfur battery anodes having Li+-**conductive pretreatment layer** and **Li metal-protective layer**)

RN 7439-93-2 HCAPLUS  
 CN Lithium (CA INDEX NAME)

Li

IT 10377-52-3, Lithium phosphate  
 RL: DEV (Device component use); USES (Uses)  
 (**pretreatment layer**; manufacture of lithium-sulfur battery anodes having Li+-**conductive pretreatment layer** and **Li metal-protective layer**)

RN 10377-52-3 HCAPLUS  
 CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li

IT 150499-39-1, Lithium metaphosphate nitride oxide  
(Li<sub>2.9</sub>(PO<sub>3</sub>)N<sub>0.46</sub>O<sub>0.3</sub>)

RL: DEV (Device component use); USES (Uses)  
(**protective layer**; manufacture of lithium-sulfur  
battery anodes having Li+-**conductive**  
**pretreatment layer** and Li  
**metal-protective layer**)

RN 150499-39-1 HCAPLUS

CN Lithium metaphosphate nitride oxide (Li<sub>2.9</sub>(PO<sub>3</sub>)N<sub>0.46</sub>O<sub>0.3</sub>) (9CI) (CA  
INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
N	0.46	17778-88-0
O	0.3	17778-80-2
O3P	1	15389-19-2
Li	2.9	7439-93-2

IC ICM H01M004-02

ICS H01M004-04; H01M004-40; H01M004-62; H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 72

IT Controlled atmospheres  
(inert, in vapor deposition; manufacture of lithium-sulfur battery  
anodes having Li+-**conductive pretreatment**  
**layer** and Li **metal-protective**  
**layer**)

IT Secondary batteries  
(lithium-sulfur; manufacture of lithium-sulfur battery anodes having  
Li+-**conductive pretreatment layer**  
and Li **metal-protective**  
**layer**)

IT Battery anodes  
Battery cathodes  
Ionic **conductors**  
Vapor deposition process  
(manufacture of lithium-sulfur battery anodes having Li+-  
**conductive pretreatment layer** and  
Li **metal-protective layer**)

IT 7704-34-9, Sulfur, uses

RL: DEV (Device component use); USES (Uses)  
(cathode; manufacture of lithium-sulfur battery anodes having Li+-  
**conductive pretreatment layer** and  
Li **metal-protective layer**)

IT 7440-01-9, Neon, uses 7440-37-1, Argon, uses 7440-59-7, Helium,  
uses

RL: NUU (Other use, unclassified); USES (Uses)  
(inert atmospheric in vapor deposition; manufacture of lithium-sulfur battery

anodes having Li+-conductive pretreatment layer and Li metal-protective layer)

IT 7439-93-2, Lithium, uses

RL: DEV (Device component use); USES (Uses)  
(manufacture of lithium-sulfur battery anodes having Li+-conductive pretreatment layer and Li metal-protective layer)

IT 10377-52-3, Lithium phosphate

RL: DEV (Device component use); USES (Uses)  
(pretreatment layer; manufacture of lithium-sulfur battery anodes having Li+-conductive pretreatment layer and Li metal-protective layer)

IT 150499-39-1, Lithium metaphosphate nitride oxide

(Li<sub>2.9</sub>(PO<sub>3</sub>)N<sub>0.4600.3</sub>)

RL: DEV (Device component use); USES (Uses)  
(protective layer; manufacture of lithium-sulfur battery anodes having Li+-conductive pretreatment layer and Li metal-protective layer)

L28 ANSWER 4 OF 4 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 1998:696839 HCAPLUS Full-text

DOCUMENT NUMBER: 129:345405

TITLE: Systems and method for secondary lithium battery manufacture

INVENTOR(S): Awa, Shoichiro; Inui, Tsuneo

PATENT ASSIGNEE(S): Fuji Photo Film Co., Ltd., Japan; Fuji Film Celltec K. K.

SOURCE: Jpn. Kokai Tokkyo Koho, 28 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
-----	----	-----	-----	
JP 10289729	A	19981027	JP 1997-99211	

199704  
16

PRIORITY APPLN. INFO.: JP 1997-99211

199704  
16

AB The systems, for the manufacture of batteries using Li containing oxide cathodes and anodes containing a Li based metal layer on an active mass mixture layer, have a ~~pretreatment means, an activation means, and a posttreatment means~~. Preferably, the pretreatment means is for dissolving homogeneously distributing Li in the metal component in the battery, the activation means is for intercalating anodes with Li, and the posttreatment means is for completing the activation. The batteries are prepared by successive pretreatment, activation, and posttreatment processes in the system.

IC ICM H01M010-38

ICS H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

=> d 130 ibib abs hitstr hitind 1-23

L30 ANSWER 1 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN  
 ACCESSION NUMBER: 2006:689221 HCAPLUS Full-text  
 DOCUMENT NUMBER: 145:127634  
 TITLE: Protected lithium anodes for lithium secondary  
 batteries  
 INVENTOR(S): Cho, Jung Geun; Kim, Min Seok; Lee, Jong Gi;  
 Lee, Sang Mok  
 PATENT ASSIGNEE(S): Samsung SDI Co., Ltd., S. Korea  
 SOURCE: Repub. Korean Kongkae Taeho Kongbo, No pp. given  
 CODEN: KRXXA7  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Korean  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
-----	----	-----	-----	
KR 2004026370	A	20040331	KR 2002-57814	200209 24
			<--	
PRIORITY APPLN. INFO.:			KR 2002-57814	200209 24

<--

AB This Li anode extends the service life of Li secondary batteries by using 2 **protection layers** separated from each other in the anode, and both of these have some distance from the end of the Li anode. The Li anode comprises: a 1st **protection layer** arranged on the surface of the Li metal, wherein the surface is opposite to the side contacting the current collector; and a 2nd **protection layer** arranged inside the Li layer. The **protection layers** have Li-ion conductivity and are separated from the end of the anode.

IC ICM H01M004-02

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

L30 ANSWER 2 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN  
 ACCESSION NUMBER: 2005:564516 HCAPLUS Full-text  
 DOCUMENT NUMBER: 143:81150  
 TITLE: Chemical protection of a lithium surface  
 INVENTOR(S): De Jonghe, Lutgard; Visco, Steven J.; Nimon,  
 Yevgeniy S.; Sukeshini, A. Mary  
 PATENT ASSIGNEE(S): Polyplus Battery Co., USA  
 SOURCE: U.S., 16 pp.  
 CODEN: USXXAM  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
-----	----	-----	-----	
US 6911280	B1	20050628	US 2002-327682	200212 20
			<--	
US 2005186469	A1	20050825	US 2005-92781	

200503

28

PRIORITY APPLN. INFO.:

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US 2001-342326P

P

200112

21

<--  
US 2002-327682

A1

200212

20

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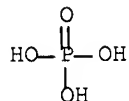
AB Disclosed are compns. and methods for alleviating the problem of reaction of lithium or other alkali or alkaline earth metals with incompatible processing and operating environments by creating a ionically **conductive** chemical protective layer on the lithium or other reactive **metal** surface. Such a chemical produced surface layer can protect lithium metal from reacting with oxygen, nitrogen or moisture in ambient atmospheric thereby allowing the lithium material to be handled outside of a controlled atmospheric, such as a dry room. Production processes involving lithium are thereby very considerably simplified. One example of such a process in the processing of lithium to form neg. electrodes for **lithium metal** batteries.

IT 10377-52-3, Lithium phosphate 184905-46-2, Lithium nitrogen phosphorus oxide

RL: DEV (Device component use); USES (Uses)  
(glass; chemical protection of lithium surface)

RN 10377-52-3 HCAPLUS

CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



● 3 Li

RN 184905-46-2 HCAPLUS

CN Lithium nitrogen phosphorus oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
N	x	17778-88-0
O	x	17778-80-2
P	x	7723-14-0
Li	x	7439-93-2

IC ICM H01M002-08

ICS H01M010-04; H01M010-26

INCL 429137000; 429246000; 429231900; 429231950; 429309000; 429319000;  
429320000; 429321000; 429322000; 429126100

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38, 57

IT Battery anodes  
Battery electrolytes  
Coating materials  
Electric **conductors**, glass

Evaporation  
Glass ceramics  
Polymer electrolytes  
(chemical protection of lithium surface)

IT 7440-55-3, Gallium, uses 10377-52-3, Lithium phosphate  
12024-22-5, Gallium sulfide (Ga<sub>2</sub>S<sub>3</sub>) 12025-34-2, Germanium sulfide  
(GeS<sub>2</sub>) 12136-58-2, Lithium sulfide (Li<sub>2</sub>S) 13759-10-9, Silicon  
sulfide (SiS<sub>2</sub>) 184905-46-2, Lithium nitrogen phosphorus  
oxide

RL: DEV (Device component use); USES (Uses)

(glass; chemical protection of lithium surface)

REFERENCE COUNT: 17 THERE ARE 17 CITED REFERENCES AVAILABLE  
FOR THIS RECORD. ALL CITATIONS AVAILABLE  
IN THE RE FORMAT

L30 ANSWER 3 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 2004:310725 HCAPLUS Full-text

DOCUMENT NUMBER: 140:324230

TITLE: **Lithium metal** anode for  
**lithium** battery

INVENTOR(S): Cho, Chung-Kun; Lee, Sang-Mock; Lee, Jong-Ki;  
Kim, Min-Seuk

PATENT ASSIGNEE(S): Samsung SDI Co., Ltd., S. Korea

SOURCE: U.S. Pat. Appl. Publ., 5 pp.

CODEN: USXXCO

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO. -----	KIND ----	DATE -----	APPLICATION NO. -----	DATE
US 2004072066	A1	20040415	US 2003-389752	200303 18
			<--	
KR 2004035909	A	20040430	KR 2002-62256	200210 12
			<--	
CN 1489229	A	20040414	CN 2003-120528	200303 13
			<--	
JP 2004134403	A	20040430	JP 2003-349215	200310 08
			<--	
JP 3787564	B2	20060621		
PRIORITY APPLN. INFO.:			KR 2002-62256	A 200210 12
			<--	

AB Provided is a **lithium metal** anode having a **lithium metal layer** and a porous  
polymer film integrated with a surface of the **lithium metal layer**. The **lithium  
metal**  
anode further includes a current collector attached to the surface of the **lithium  
metal layer** opposite the porous polymer film. The **lithium metal** anode further  
includes a **protective coating layer** between the porous polymer film and the



lithium metal layer, the protective coating layer having lithium ionic conductivity and impermeable to an electrolyte.

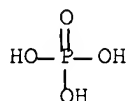
IT 7439-93-2, Lithium, uses 7439-93-2D,  
Lithium, salt 10377-52-3, Lithium  
phosphate 184905-46-2, Lithium nitrogen phosphorus oxide  
RL: DEV (Device component use); USES (Uses)  
(lithium metal anode for lithium  
battery)  
RN 7439-93-2 HCAPLUS  
CN Lithium (CA INDEX NAME)

Li

RN 7439-93-2 HCAPLUS  
CN Lithium (CA INDEX NAME)

Li

RN 10377-52-3 HCAPLUS  
CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li

RN 184905-46-2 HCAPLUS  
CN Lithium nitrogen phosphorus oxide (CA INDEX NAME)

Component	Ratio	Component
		Registry Number
=====	=====	=====
N	x	17778-88-0
O	x	17778-80-2
P	x	7723-14-0
Li	x	7439-93-2

IC ICM H01M002-16  
ICS H01M002-18; H01M004-40; H01M010-04  
INCL 429137000; 429231950; 429246000; 029623200  
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38  
ST lithium metal anode battery  
IT Polyoxyalkylenes, uses  
Polysiloxanes, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(layer; lithium metal anode for  
lithium battery)

- IT Battery anodes  
Coating materials  
(lithium metal anode for lithium battery)
- IT Fluoropolymers, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(lithium metal anode for lithium battery)
- IT Secondary batteries  
(lithium; lithium metal anode for lithium battery)
- IT Ethers, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(polycyclic, fluoro-; lithium metal anode for lithium battery)
- IT Energy-rich phosphates  
RL: TEM (Technical or engineered material use); USES (Uses)  
(polymers; lithium metal anode for lithium battery)
- IT 7440-02-0, Nickel, uses 7440-50-8, Copper, uses  
RL: DEV (Device component use); USES (Uses)  
(current collector; lithium metal anode for lithium battery)
- IT 9002-88-4, Polyethylene 9003-07-0, Polypropylene  
RL: TEM (Technical or engineered material use); USES (Uses)  
(film; lithium metal anode for lithium battery)
- IT 25322-68-3, Peo 49717-87-5, 2-Propenoic acid, ion(1-) homopolymer, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(layer; lithium metal anode for lithium battery)
- IT 110-71-4 111-96-6, Diglyme 126-33-0, Sulfolane 646-06-0, Dioxolane 7439-93-2, Lithium, uses 7439-93-2D, Lithium, salt 10377-52-3, Lithium phosphate 12627-14-4, Lithium silicate 12676-27-6 26134-62-3, Lithium nitride 33454-82-9, Lithium triflate 37220-89-6, Lithium aluminate 39302-37-9, Lithium titanium oxide 152747-89-2, Lanthanum lithium oxide 184905-46-2, Lithium nitrogen phosphorus oxide 236388-73-1, Lithium silicide sulfide 236388-74-2, Lithium boride sulfide 236388-75-3, Aluminum lithium sulfide 236388-76-4, Lithium phosphide sulfide 342379-43-5, Germanium lithium sulfide  
RL: DEV (Device component use); USES (Uses)  
(lithium metal anode for lithium battery)
- IT 9002-84-0, Ptfe 9011-14-7, Pmma 9011-17-0, Hexafluoropropylene-vinylidene fluoride copolymer 24937-79-9, PvdF 25014-41-9, Polyacrylonitrile 25067-11-2, Hexafluoropropylene-tetrafluoroethylene copolymer 59947-24-9, Polychlorofluoroethylene  
RL: TEM (Technical or engineered material use); USES (Uses)  
(lithium metal anode for lithium battery)

L30 ANSWER 4 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN  
ACCESSION NUMBER: 2004:252055 HCAPLUS Full-text  
DOCUMENT NUMBER: 140:256340  
TITLE: Anodes for lithium battery

INVENTOR(S): Kim, Yong-tae; Choi, Su-suk; Choi, Yun-suk; Lee, Kyoung-hee  
 PATENT ASSIGNEE(S): Samsung Sdi Co., Ltd., S. Korea  
 SOURCE: U.S. Pat. Appl. Publ., 10 pp.  
 CODEN: USXXCO  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO. -----	KIND ----	DATE -----	APPLICATION NO. -----	DATE
US 2004058232	A1	20040325	US 2003-664157	200309 17
			<--	
KR 2004026208	A	20040330	KR 2002-57577	200209 23
			<--	
JP 2004119372	A	20040415	JP 2003-308015	200308 29
			<--	
CN 1492523	A	20040428	CN 2003-158726	200309 22
			<--	
PRIORITY APPLN. INFO.:			KR 2002-57577	A 200209 23
			<--	

AB A lithium neg. electrode for a lithium battery has good cycle life and capacity characteristics. The lithium neg. electrode comprises a **lithium metal layer** and a **protective layer** present on the **lithium metal layer**, where the **protective layer** includes an organosulfur compound. An organosulfur compound having a thiol terminal group is preferred since such a compound can form a complex with **lithium metal** to enable coating to be carried out easily. The organosulfur compound has a large number of S or N elements having high electronegativity to form a complex with lithium ions, so it renders lithium ions to be deposited relatively evenly on the **lithium metal** surface, reducing dendrite formation.

IC ICM H01M002-16  
 ICS H01M004-66; H01M004-40  
 INCL 429137000; 429246000; 429245000; 429212000; 429231950  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 38  
 IT Battery anodes  
 Coating materials  
 Conducting polymers  
 (anodes for lithium battery)  
 IT 7704-34-9D, Sulfur, organosulfur compound  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (protective layer; anodes for lithium battery)

L30 ANSWER 5 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN  
 ACCESSION NUMBER: 2003:306576 HCAPLUS Full-text  
 DOCUMENT NUMBER: 139:182767  
 TITLE: Li3PO4:N/LiCoO2 coatings for thin film batteries

AUTHOR(S): Gross, M. E.; Martin, P. M.; Stewart, D. C.;  
Johnston, J. W.; Windisch, C. F.; Graff, G. L.;  
Rissmiller, P. L.; Dudeck, E. L.  
CORPORATE SOURCE: Pacific Northwest National Laboratory, Richland,  
WA, USA  
SOURCE: Annual Technical Conference Proceedings -  
Society of Vacuum Coaters (2002),  
45th, 119-124  
CODEN: ATCCDI; ISSN: 0731-1699  
PUBLISHER: Society of Vacuum Coaters  
DOCUMENT TYPE: Journal  
LANGUAGE: English

AB Li3PO4:N (LIPON)/Li1.04CoO2 thin film battery structures were deposited up to 2  $\mu$ m thick were deposited using a 15.2 cm diameter Li2.9PO3.5 pressed powder target for reactive RF magnetron sputtering. Li1.04CoO2 thin films were deposited using a 15.2 cm diameter LiCoO2 pressed powder target. LIPON films were deposited in an ultra pure N2 atmosphere and LiCoO2 films were deposited in an ultra pure atmospheric of Ar + O2. Total chamber pressure during deposition ranged between 5 and 20 mtorr and RF power to the sputtering targets ranged from 100 W to 450 W. Because XPS gave ambiguous compositional results, the films were optimized for a.c. and d.c. conductivity Elec. conductivity was extremely sensitive to deposition conditions, deposition rate, sputtering gas pressure, and reactive gas partial pressure. AC conductivity measurements were made at a frequency of 10 kHz, and were correlated to d.c. conductivity measurements. LIPON films had the highest conductivities in the 660 nS cm-1 range and the highest a.c. conductivity of Li1.04CoO2 films was .apprx.0.24 S cm-1. Earlier work showed the most conductive films were deposited at 20 mtorr pressures and target powers of 100 W. This work has scaled up to conductive films being deposited at 7.5 mtorr pressures and target powers of 400 W. X-ray diffraction anal. showed that the films were mostly amorphous. Films deposited under these conditions were transparent at visible wavelengths with a refractive index of 1.6. Lower conductivity films were brownish in appearance and had less transmission than films with high conductivity The rechargeable battery structure consisting of an alumina substrate, gold current collector, 0.5- $\mu$ m Li1.04CoO2 cathode, 1.2- $\mu$ m LIPON electrolyte, Li metal anode, and a copper current collector are currently under test. Early thin film battery cycle testing was successful, addnl. testing is on-going. Performance results are correlated with film properties and reported. Future work will involve optimization of battery performance on a large scale and scale up of the deposition process to include flexible web processing.

IT 203402-92-0P, Lithium nitride phosphate  
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
(LIPON, sputtered layer; Li3PO4:N/LiCoO2 coatings for thin film secondary batteries)

RN 203402-92-0 HCAPLUS

CN Lithium nitride phosphate (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
N	x	17778-88-0
O4P	x	14265-44-2
Li	x	7439-93-2

IT 581094-51-1, Lithium metaphosphate oxide (Li2.9(PO3)O0.5)  
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process)  
(pressed powder target; Li3PO4:N/LiCoO2 coatings for thin film secondary batteries)  
RN 581094-51-1 HCAPLUS

CN Lithium metaphosphate oxide (Li<sub>2.9</sub>(PO<sub>3</sub>)O<sub>0.5</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	0.5	17778-80-2
O3P	1	15389-19-2
Li	2.9	7439-93-2

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 57

ST Li<sub>3</sub>PO<sub>4</sub> LiCoO<sub>2</sub> coating thin film reactive RF magnetron sputtering;  
XRD secondary lithium battery electrolyte electrode **cond**  
SEM voltammetry

IT Battery electrodes  
Battery electrolytes  
Cyclic voltammetry  
Electric **conductivity**  
Electric impedance  
Secondary batteries

(Li<sub>3</sub>PO<sub>4</sub>:N/LiCoO<sub>2</sub> coatings for thin film secondary batteries)  
IT 203402-92-0P, Lithium nitride phosphate  
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic  
preparation); PREP (Preparation); USES (Uses)  
(LIPON, sputtered **layer**; Li<sub>3</sub>PO<sub>4</sub>:N/LiCoO<sub>2</sub> coatings for  
thin film secondary batteries)

IT 581094-51-1, Lithium metaphosphate oxide (Li<sub>2.9</sub>(PO<sub>3</sub>)O<sub>0.5</sub>)  
RL: CPS (Chemical process); PEP (Physical, engineering or chemical  
process); PYP (Physical process); PROC (Process)  
(pressed powder target; Li<sub>3</sub>PO<sub>4</sub>:N/LiCoO<sub>2</sub> coatings for thin film  
secondary batteries)

IT 152829-46-4P, Cobalt lithium oxide (CoLi<sub>1.04</sub>O<sub>2</sub>)  
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic  
preparation); PREP (Preparation); USES (Uses)  
(sputtered **layer**, cathode; Li<sub>3</sub>PO<sub>4</sub>:N/LiCoO<sub>2</sub> coatings for  
thin film secondary batteries)

REFERENCE COUNT: 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR  
THIS RECORD. ALL CITATIONS AVAILABLE IN  
THE RE FORMAT

L30 ANSWER 6 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 2002:925553 HCAPLUS Full-text

DOCUMENT NUMBER: 138:15255

TITLE: Thin solid electrolyte battery

INVENTOR(S): Ito, Shuji; Iwamoto, Kazuya; Ukaji, Masaya;  
Nanai, Norishige; Matsuda, Hiromu; Mino,  
Tatsuji; Honda, Kazuyoshi; Takai, Yoriko

PATENT ASSIGNEE(S): Matsushita Electric Industrial Co., Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 11 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
-----	----	-----	-----	-----
JP 2002352850	A	20021206	JP 2001-154955	200105

24

PRIORITY APPLN. INFO.:

JP 2001-154955

200105

24

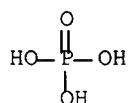
&lt;--

AB The battery has successive **layers** of a 1st collector, a first active mass, an electrolyte, a 2nd active mass and a 2nd collector connected to elec. **conductors**; where the thickness of the 1st active mass **layer** and the electrolyte **layer** is 1-20 and 1-10  $\mu\text{m}$ , resp. Preferably, the collectors are orthogonal to the **conductor**, the electrolyte is  $(\text{Li}_2\text{S})_x(\text{SiS}_2)_y(\text{Li}_3\text{PO}_4)_z$  [ $(x+y+z)=1$ ,  $x=0.3-0.8$ ,  $y=0.2-0.7$  and  $z=0.01-0.3$ ], and the 1st or 2nd active mass is  $\text{Li}_3\text{-aMaN}$  ( $0.2 < a < 0.6$ ;  $\text{M} = \text{Co, Ni, Cu and/or Mn}$ ).

IT 10377-52-3, Lithium phosphate ( $\text{Li}_3\text{PO}_4$ ) 477704-33-9  
 , Lithium nitride oxide phosphide ( $\text{Li}_{2.9}\text{N}_{0.46}\text{O}_{3.3}\text{P}$ )  
 RL: DEV (Device component use); USES (Uses)  
 (comps. of solid electrolyte for thin secondary lithium batteries)

RN 10377-52-3 HCAPLUS

CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li

RN 477704-33-9 HCAPLUS

CN Lithium nitride oxide phosphide ( $\text{Li}_{2.9}\text{N}_{0.46}\text{O}_{3.3}\text{P}$ ) (9CI) (CA INDEX NAME)

Component	Ratio	Component	Registry Number
N	0.46		17778-88-0
O	3.3		17778-80-2
P	1		7723-14-0
Li	2.9		7439-93-2

IC ICM H01M010-36  
 ICS H01M010-36; H01M002-26; H01M002-30; H01M004-02; H01M004-58

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST thin battery solid electrolyte **lithium metal**  
 nitride electrode

IT 10377-51-2, Lithium iodide ( $\text{LiI}$ ) 10377-52-3, Lithium phosphate ( $\text{Li}_3\text{PO}_4$ ) 12136-58-2, Lithium sulfide ( $\text{Li}_2\text{S}$ ) 13759-10-9, Silicon sulfide ( $\text{SiS}_2$ ) 90076-65-6, Lithium bis(trifluoromethanesulfonyl) imide 201471-17-2, Lithium phosphate sulfide thiosilicate ( $\text{Li}_{1.29}(\text{PO}_4)_0.01\text{S}_{0.27}(\text{SiS}_3)_0.36$ ) 477704-33-9, Lithium nitride oxide phosphide ( $\text{Li}_{2.9}\text{N}_{0.46}\text{O}_{3.3}\text{P}$ )  
 RL: DEV (Device component use); USES (Uses)  
 (comps. of solid electrolyte for thin secondary lithium batteries)

L30 ANSWER 7 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN  
 ACCESSION NUMBER: 2002:502703 HCAPLUS Full-text  
 DOCUMENT NUMBER: 137:65723  
 TITLE: **Layered** arrangements of lithium anodes  
 for batteries  
 INVENTOR(S): Chu, May-Ying; Visco, Steven J.; Dejonghe,  
 Lutgard C.  
 PATENT ASSIGNEE(S): Polyplus Battery Company, USA  
 SOURCE: U.S., 25 pp., Cont.-in-part of U.S. Ser. No.  
 431,190.  
 CODEN: USXXAM  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 3  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 6413285	B1	20020702	US 2000-640467	200008 16
US 6413284	B1	20020702	US 1999-431190	199911 01
CA 2387796	A1	20010510	CA 2000-2387796	200010 27
WO 2001033651	A1	20010510	WO 2000-US29732	200010 27
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
EP 1230694	A1	20020814	EP 2000-973968	200010 27
BR 2000015111	A	20021126	BR 2000-15111	200010 27
JP 2003529895	T	20031007	JP 2001-535247	200010 27
AU 779944	B2	20050217	AU 2001-12407	200010

27

WO 2002015301 A2 20020221 WO 2001-US24342  
200108  
02

WO 2002015301 A3 20020926  
WO 2002015301 A9 20030403

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH,  
CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH,  
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK,  
LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ,  
PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ,  
UA, UG, US, UZ, VN, YU, ZA, ZW  
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AM, AZ, BY,  
KG, KZ, MD, RU, TJ, TM, AT, BE, CH, CY, DE, DK, ES, FI, FR,  
GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI,  
CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

AU 2001081022 A5 20020225 AU 2001-81022  
200108  
02

US 2002034688 A1 20020321 US 2001-999673  
200110  
30

US 6737197 B2 20040518  
PRIORITY APPLN. INFO.: US 1999-431190 A2  
199911  
01

US 2000-640467 A  
200008  
16

WO 2000-US29732 W  
200010  
27

WO 2001-US24342 W  
200108  
02

AB A method employing a bonding **layer** is used to form active metal electrodes having barrier **layers**. Active **metals** such as **lithium** are highly reactive in ambient conditions. The method involves fabricating a lithium electrode or other active metal electrode without depositing the barrier **layer** on a **layer** of metal. Rather a smooth barrier **layer** is formed on a smooth substrate such as a web carrier or polymeric electrolyte. A bonding or alloying **layer** is formed on top of the barrier **layer**. Lithium or other active material is then attached to the bonding **layer** to form the active metal electrode. A current collector may also be attached to the **lithium** or active **metal** during the process.

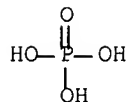
IT 10377-52-3, Lithium phosphate 184905-46-2, Lithium nitrogen phosphorus oxide

RL: TEM (Technical or engineered material use); USES (Uses)  
(glass, barrier **layer**; **layered** arrangements  
of lithium anodes for batteries)

RN 10377-52-3 HCAPLUS

CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)





●<sup>3</sup> Li

RN 184905-46-2 HCAPLUS

CN Lithium nitrogen phosphorus oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
N	x	17778-88-0
O	x	17778-80-2
P	x	7723-14-0
Li	x	7439-93-2

IC ICM H01M004-04

ICS H01M004-36

INCL 029623400

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST battery lithium anode **layered** arrangement

IT Glass, uses

RL: TEM (Technical or engineered material use); USES (Uses)  
(**barrier layer**; **layered** arrangements of  
lithium anodes for batteries)

IT Vapor deposition process

(chemical; **layered** arrangements of lithium anodes for  
batteries)

IT Battery anodes

Battery electrolytes

Ionic conductivity

(**layered** arrangements of lithium anodes for batteries)

IT Polyoxyalkylenes, uses

RL: DEV (Device component use); USES (Uses)

(**layered** arrangements of lithium anodes for batteries)

IT Polyethers, uses

RL: TEM (Technical or engineered material use); USES (Uses)

(**layered** arrangements of lithium anodes for batteries)

IT Polymer blends

RL: TEM (Technical or engineered material use); USES (Uses)

(**layered** arrangements of lithium anodes for batteries)

IT Polyphosphazenes

RL: TEM (Technical or engineered material use); USES (Uses)

(**layered** arrangements of lithium anodes for batteries)

IT Polythioethers

RL: TEM (Technical or engineered material use); USES (Uses)

(**layered** arrangements of lithium anodes for batteries)

IT Primary batteries

(lithium; **layered** arrangements of lithium anodes for  
batteries)

IT Vapor deposition process

(phys.; **layered** arrangements of lithium anodes for  
batteries)

IT Imines

- RL: TEM (Technical or engineered material use); USES (Uses)  
(polyimines; **layered** arrangements of lithium anodes for  
batteries)
- IT Polymers, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(releasable web carrier; **layered** arrangements of  
lithium anodes for batteries)
- IT Polyesters, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(substrate; **layered** arrangements of lithium anodes for  
batteries)
- IT Aluminum alloy, base  
RL: TEM (Technical or engineered material use); USES (Uses)  
(foil bonding **layer**; **layered** arrangements of  
lithium anodes for batteries)
- IT Lithium alloy, base  
RL: TEM (Technical or engineered material use); USES (Uses)  
(**layered** arrangements of lithium anodes for batteries)
- IT 7439-92-1, Lead, uses 7439-93-2, Lithium, uses 7439-95-4,  
Magnesium, uses 7439-96-5, Manganese, uses 7440-21-3, Silicon,  
uses 7440-22-4, Silver, uses 7440-32-6, Titanium, uses  
7440-36-0, Antimony, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(foil bonding **layer**; **layered** arrangements of  
lithium anodes for batteries)
- IT 10377-52-3, Lithium phosphate 12627-14-4, Lithium silicate  
12676-27-6 37220-89-6, Lithium aluminate 184905-46-2,  
Lithium nitrogen phosphorus oxide 236388-73-1, Lithium silicide  
sulfide 236388-74-2, Lithium boride sulfide 236388-75-3,  
Aluminum lithium sulfide 236388-76-4, Lithium phosphide sulfide  
RL: TEM (Technical or engineered material use); USES (Uses)  
(glass, barrier **layer**; **layered** arrangements  
of lithium anodes for batteries)
- IT 12798-95-7  
RL: DEV (Device component use); USES (Uses)  
(**layered** arrangements of lithium anodes for batteries)
- IT 12597-68-1, Stainless steel, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(**layered** arrangements of lithium anodes for batteries)
- IT 7429-90-5, Aluminum, uses 7439-89-6, Iron, uses 7440-31-5, Tin,  
uses 7440-50-8, Copper, uses 7440-66-6, Zinc, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(releasable web carrier; **layered** arrangements of  
lithium anodes for batteries)
- IT 25038-59-9, Polyethylene terephthalate, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(substrate; **layered** arrangements of lithium anodes for  
batteries)

REFERENCE COUNT: 28 THERE ARE 28 CITED REFERENCES AVAILABLE  
FOR THIS RECORD. ALL CITATIONS AVAILABLE  
IN THE RE FORMAT

L30 ANSWER 8 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN  
ACCESSION NUMBER: 2002:143080 HCAPLUS Full-text  
DOCUMENT NUMBER: 136:186681  
TITLE: **Layered** arrangements of lithium anodes  
for lithium-sulfur batteries  
INVENTOR(S): Chu, May-Ying; Visco, Steven J.; Dejonghe,  
Lutgard C.  
PATENT ASSIGNEE(S): Polyplus Battery Company, USA

SOURCE: PCT Int. Appl., 51 pp.  
 CODEN: PIXXD2  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 3  
 PATENT INFORMATION:

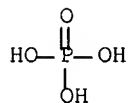
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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WO 2002015301	A2	20020221	WO 2001-US24342	200108 02
			<--	
WO 2002015301	A3	20020926		
WO 2002015301	A9	20030403		
W:			AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW	
RW:			GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG	
US 6413285	B1	20020702	US 2000-640467	200008 16
			<--	
AU 2001081022	A5	20020225	AU 2001-81022	200108 02
			<--	
PRIORITY APPLN. INFO.:			US 2000-640467	A 200008 16
			<--	
			US 1999-431190	A2 199911 01
			<--	
			WO 2001-US24342	W 200108 02
			<--	

AB A method employing a bonding **layer** is used to form active metal electrodes having barrier **layers**. Active **metals** such as **lithium** are highly reactive in ambient conditions. The method involves fabricating a lithium electrode or other active metal electrode without depositing the barrier **layer** on a **layer** of metal. Rather a smooth barrier **layer** is formed on a smooth substrate such as a web carrier or polymeric electrolyte. A bonding or alloying **layer** is formed on top of the barrier **layer**. Lithium or other active material is then attached to the bonding **layer** to form the active metal electrode. A current collector may also be attached to the **lithium** or active **metal** during the process.

IT 10377-52-3, Lithium phosphate 184905-46-2, Lithium nitrogen phosphorus oxide

RL: TEM (Technical or engineered material use); USES (Uses)  
 (releasable web carrier **layer**; **layered**  
 arrangements of lithium anodes for lithium-sulfur batteries)

RN 10377-52-3 HCAPLUS  
 CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●<sub>3</sub> Li

RN 184905-46-2 HCAPLUS  
 CN Lithium nitrogen phosphorus oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
N	x	17778-88-0
O	x	17778-80-2
P	x	7723-14-0
Li	x	7439-93-2

IC ICM H01M004-00  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 ST lithium sulfur battery anode **layered** arrangement  
 IT Vapor deposition process  
     (chemical; **layered** arrangements of lithium anodes for  
     lithium-sulfur batteries)  
 IT Battery anodes  
     (**layered** arrangements of lithium anodes for  
     lithium-sulfur batteries)  
 IT Polyethers, uses  
     Polymer blends  
     Polyoxyalkylenes, uses  
     Polyphosphazenes  
     Polythioethers  
     RL: DEV (Device component use); USES (Uses)  
     (**layered** arrangements of lithium anodes for  
     lithium-sulfur batteries)  
 IT Polyesters, uses  
     RL: TEM (Technical or engineered material use); USES (Uses)  
     (**layered** arrangements of lithium anodes for  
     lithium-sulfur batteries)  
 IT Sulfide glasses  
     RL: TEM (Technical or engineered material use); USES (Uses)  
     (lithium borosulfide, releasable web carrier **layer**;  
     **layered** arrangements of lithium anodes for lithium-sulfur  
     batteries)  
 IT Sulfide glasses  
     RL: TEM (Technical or engineered material use); USES (Uses)  
     (lithium silicon sulfide, releasable web carrier **layer**;  
     **layered** arrangements of lithium anodes for lithium-sulfur  
     batteries)  
 IT Primary batteries  
     (lithium; **layered** arrangements of lithium anodes for  
     lithium-sulfur batteries)  
 IT Vapor deposition process

- (phys.; **layered** arrangements of lithium anodes for lithium-sulfur batteries)
- IT Imines  
RL: DEV (Device component use); USES (Uses)  
(polyimines; **layered** arrangements of lithium anodes for lithium-sulfur batteries)
- IT Glass, uses  
Polymers, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(releasable web carrier **layer**; **layered** arrangements of lithium anodes for lithium-sulfur batteries)
- IT Aluminum alloy, base  
Titanium alloy, base  
RL: TEM (Technical or engineered material use); USES (Uses)  
(foil bonding **layer**; **layered** arrangements of lithium anodes for lithium-sulfur batteries)
- IT Lithium alloy, base  
RL: DEV (Device component use); USES (Uses)  
(**layered** arrangements of lithium anodes for lithium-sulfur batteries)
- IT 7439-96-5, Manganese, uses 7440-21-3, Silicon, uses 7440-22-4, Silver, uses 7440-36-0, Antimony, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(foil bonding **layer**; **layered** arrangements of lithium anodes for lithium-sulfur batteries)
- IT 7439-93-2, Lithium, uses  
RL: DEV (Device component use); USES (Uses)  
(**layered** arrangements of lithium anodes for lithium-sulfur batteries)
- IT 12798-95-7  
RL: DEV (Device component use); FMU (Formation, unclassified); FORM (Formation, nonpreparative); USES (Uses)  
(**layered** arrangements of lithium anodes for lithium-sulfur batteries)
- IT 25038-59-9, Polyethylene terephthalate, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(**layered** arrangements of lithium anodes for lithium-sulfur batteries)
- IT 7429-90-5, Aluminum, uses 7439-89-6, Iron, uses 7440-31-5, Tin, uses 7440-50-8, Copper, uses 7440-66-6, Zinc, uses 10377-52-3, Lithium phosphate 12627-14-4, Lithium silicate 12676-27-6 37220-89-6, Lithium aluminate 184905-46-2, Lithium nitrogen phosphorus oxide 236388-75-3, Aluminum lithium sulfide 236388-76-4, Lithium phosphide sulfide  
RL: TEM (Technical or engineered material use); USES (Uses)  
(releasable web carrier **layer**; **layered** arrangements of lithium anodes for lithium-sulfur batteries)

L30 ANSWER 9 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 2002:90544 HCAPLUS Full-text

DOCUMENT NUMBER: 136:137424

TITLE: Fabrication of lithium anodes and batteries

INVENTOR(S): Skotheim, Terje A.; Sheehan, Christopher J.;  
Mikhaylik, Yuriy V.; Affinito, John

PATENT ASSIGNEE(S): USA

SOURCE: U.S. Pat. Appl. Publ., 22 pp., Cont.-in-part of  
U.S. Ser. No. 721,578.

CODEN: USXXCO

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 3  
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2002012846	A1	20020131	US 2001-864890	20010523
US 6733924	B1	20040511	US 2000-721519	20001121
US 6797428	B1	20040928	US 2000-721578	20001121
CN 1728418	A	20060201	CN 2005-10079023	20001121
WO 2002095849	A2	20021128	WO 2002-US16649	20020523
WO 2002095849	A3	20031204		
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
AU 2002312067	A1	20021203	AU 2002-312067	20020523
EP 1407505	A2	20040414	EP 2002-739419	20020523
EP 1407505	B1	20050803		
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR				
CN 1511351	A	20040707	CN 2002-810473	20020523
JP 2004527888	T	20040909	JP 2002-592213	20020523
US 2005008935	A1	20050113	US 2004-913839	20040806

US 6936381 B2 20050830  
US 2006222954 A1 20061005 US 2006-452445

200606  
13

## PRIORITY APPLN. INFO.:

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US 1999-167171P P  
199911  
23

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US 2000-721519 A2  
200011  
21

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US 2000-721578 A2  
200011  
21

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CN 2000-818169 A3  
200011  
21

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US 2001-864890 A  
200105  
23

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WO 2002-US16649 W  
200205  
23

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AB Provided is an anode for use in electrochem. cells, wherein the anode active **layer** has a first **layer** comprising **lithium metal** and a multi-**layer** structure comprising single ion **conducting layers** and polymer **layers** in contact with the first **layer** comprising **lithium metal** or in contact with an intermediate **protective layer**, such as a temporary **protective metal layer**, on the surface of the lithium-containing first **layer**. Another aspect of the invention provides an anode active **layer** formed by the in-situ deposition of lithium vapor and a reactive gas. The anodes of the current invention are particularly useful in electrochem. cells comprising sulfur-containing cathode active materials, such as elemental sulfur.

IT 184905-46-2, Lithium nitrogen phosphorus oxide  
RL: DEV (Device component use); USES (Uses)  
(fabrication of lithium anodes and batteries)

RN 184905-46-2 HCAPLUS

CN Lithium nitrogen phosphorus oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
N	x	17778-88-0
O	x	17778-80-2
P	x	7723-14-0
Li	x	7439-93-2

IC ICM H01M004-40

ICS H01M004-66; B05D005-12

INCL 429231950

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

IT 110-71-4 646-06-0, 1,3-Dioxolane 1344-28-1, Dispal 11N7-12, uses  
7439-93-2, Lithium, uses 7704-34-9, Sulfur, uses 12031-63-9,  
Lithium niobium oxide (LiNbO3) 12769-51-6, Lithium tantalum oxide

37220-89-6, Lithium aluminate 39302-37-9, Lithium titanium oxide  
 90076-65-6, Lithium bis(trifluoromethylsulfonyl)imide 152747-89-2,  
 Lanthanum lithium oxide 184905-46-2, Lithium nitrogen  
 phosphorus oxide 236388-73-1, Lithium silicide sulfide  
 236388-74-2, Lithium boride sulfide 236388-75-3, Aluminum lithium  
 sulfide 342379-43-5, Germanium lithium sulfide  
 RL: DEV (Device component use); USES (Uses)  
 (fabrication of lithium anodes and batteries)

L30 ANSWER 10 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN  
 ACCESSION NUMBER: 2001:900301 HCAPLUS Full-text  
 DOCUMENT NUMBER: 136:22000  
 TITLE: Anode of lithium secondary battery  
 INVENTOR(S): Kugai, Hirokazu; Ota, Nobuhiro; Yamanaka,  
 Shosaku  
 PATENT ASSIGNEE(S): Sumitomo Electric Industries, Ltd., Japan  
 SOURCE: Eur. Pat. Appl., 5 pp.  
 CODEN: EPXXDW  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

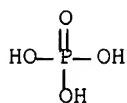
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 1162675	A2	20011212	EP 2001-305020	200106 08
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EP 1162675	A3	20040908		
EP 1162675	B1	20061004		
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
JP 2001351615	A	20011221	JP 2000-172073	200006 08
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US 2002018939	A1	20020214	US 2001-838182	200104 20
<--				
US 6699619	B2	20040302		
PRIORITY APPLN. INFO.:			JP 2000-172073	A 200006 08

AB A lithium-secondary-battery neg. electrode has a **protective layer** to prevent the surface deterioration of the inorg. solid electrolytic **layer**. The neg. electrode comprises **metallic lithium** or a **lithium-containing metal**, a first inorg. solid electrolytic **layer** (thickness: a) formed on the metal, and a second inorg. solid electrolytic **layer** (thickness: b) formed on the first inorg. solid electrolytic **layer**. The thickness ratio b/a is specified to be more than 0.5.

IT 10377-52-3, Lithium phosphate  
 RL: DEV (Device component use); USES (Uses)  
 (anode of lithium secondary battery)

RN 10377-52-3 HCAPLUS  
 CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)





●3 Li

IC ICM H01M004-02  
ICS H01M010-40  
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
IT 96-49-1, Ethylene carbonate 108-32-7, Propylene carbonate  
7439-93-2, Lithium, uses 7440-50-8, Copper, uses 10377-48-7,  
Lithium sulfate 10377-52-3, Lithium phosphate  
12136-58-2, Lithium sulfide 12190-79-3, Cobalt lithium oxide  
colio2 13453-84-4, Lithium silicate 13759-10-9, Silicon sulfide  
sis2 21324-40-3, Lithium hexafluorophosphate 25014-41-9,  
Polyacrylonitrile 196418-93-6, Lithium phosphate silicide sulfide  
RL: DEV (Device component use); USES (Uses)  
(anode of lithium secondary battery)

L30 ANSWER 11 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN  
ACCESSION NUMBER: 2001:397240 HCAPLUS Full-text  
DOCUMENT NUMBER: 135:7792  
TITLE: Lithium anodes for electrochemical cells  
INVENTOR(S): Skotheim, Terje A.; Sheehan, Christopher J.;  
Mikhaylik, Yuriy V.  
PATENT ASSIGNEE(S): Moltech Corporation, USA  
SOURCE: PCT Int. Appl., 41 pp.  
CODEN: PIXXD2  
DOCUMENT TYPE: Patent  
LANGUAGE: English  
FAMILY ACC. NUM. COUNT: 3  
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2001039303	A1	20010531	WO 2000-US32234	200011 21
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W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
AU 2001017967	A5	20010604	AU 2001-17967	200011 21
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EP 1234348	A1	20020828	EP 2000-980746	200011

21

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EP 1234348 B1 20031022  
 R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC,  
 PT, IE, SI, LT, LV, FI, RO, MK, CY, AL  
 JP 2003515893 T 20030507 JP 2001-540870

200011  
 21

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CN 1728418 A 20060201 CN 2005-10079023

200011  
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PRIORITY APPLN. INFO.: US 1999-167171P P

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CN 2000-818169 A3

200011  
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&lt;--

WO 2000-US32234 W

200011  
 21

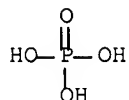
&lt;--

AB Provided are lithium anodes for use in electrochem. cells, where the anode active layer has a first layer comprising lithium metal and a second layer of a temporary protective material, wherein the temporary protective material is a metal capable of forming an alloy with lithium metal or is capable of diffusing into lithium metal. The present invention also pertains to methods of forming such anodes, electrochem. cells comprising such anodes, and methods of making such cells.

IT 10377-52-3, Lithium phosphate 184905-46-2, Lithium nitrogen phosphorus oxide  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (lithium anodes for electrochem. cells)

RN 10377-52-3 HCAPLUS

CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



● 3 Li

RN 184905-46-2 HCAPLUS  
 CN Lithium nitrogen phosphorus oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
N	x	17778-88-0
O	x	17778-80-2
P	x	7723-14-0
Li	x	7439-93-2

IC ICM H01M004-02  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 IT Battery anodes  
     Conducting polymers  
     Laser ablation  
     Sputtering  
         (lithium anodes for electrochem. cells)  
 IT 10377-52-3, Lithium phosphate 11115-95-0, Lithium niobium  
     oxide 12627-14-4, Lithium silicate 12674-25-8, Germanium lithium  
     oxide 17372-42-8 25038-59-9, Polyethylene terephthalate, uses  
     37220-89-6, Lithium aluminate 152747-89-2, Lanthanum lithium oxide  
     184905-46-2, Lithium nitrogen phosphorus oxide  
     236388-73-1, Lithium silicide sulfide 342379-43-5, Germanium  
     lithium sulfide  
     RL: TEM (Technical or engineered material use); USES (Uses)  
         (lithium anodes for electrochem. cells)  
 IT 7429-90-5, Aluminum, uses 7439-92-1, Lead, uses 7439-95-4,  
     Magnesium, uses 7440-06-4, Platinum, uses 7440-22-4, Silver,  
     uses 7440-31-5, Tin, uses 7440-43-9, Cadmium, uses 7440-50-8,  
     Copper, uses 7440-55-3, Gallium, uses 7440-56-4, Germanium, uses  
     7440-57-5, Gold, uses 7440-66-6, Zinc, uses 7440-69-9, Bismuth,  
     uses 7440-74-6, Indium, uses  
     RL: TEM (Technical or engineered material use); USES (Uses)  
         (temporary protective metal; lithium anodes  
         for electrochem. cells)

REFERENCE COUNT: 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR  
 THIS RECORD. ALL CITATIONS AVAILABLE IN  
 THE RE FORMAT

L30 ANSWER 12 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN  
 ACCESSION NUMBER: 2001:397239 HCAPLUS Full-text  
 DOCUMENT NUMBER: 135:7791  
 TITLE: Lithium anodes for electrochemical cells  
 INVENTOR(S): Skotheim, Terje A.; Sheehan, Christopher J.;  
               Mikhaylik, Yuriy V.; Affinito, John  
 PATENT ASSIGNEE(S): Moltech Corporation, USA  
 SOURCE: PCT Int. Appl., 39 pp.  
           CODEN: PIXXD2  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 3  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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WO 2001039302	A1	20010531	WO 2000-US32232	200011 21

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W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH,  
 CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH,  
 GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK,  
 LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ,  
 PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ,  
 UA, UG, US, UZ, VN, YU, ZA, ZW  
 RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH,  
 CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE,  
 TR, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD,  
 TG

AU 2001016286      A5      20010604      AU 2001-16286      200011  
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EP 1236231      A1      20020904      EP 2000-978872      <--  
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R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC,  
PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR  
JP 2003515892      T      20030507      JP 2001-540869      <--  
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CN 1728418      A      20060201      CN 2005-10079023      <--  
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PRIORITY APPLN. INFO.:      US 1999-167171P      P      <--  
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CN 2000-818169      A3      <--  
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WO 2000-US32232      W      <--  
200011  
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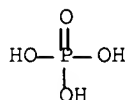
AB      Provided is an anode for use in electrochem. cells, wherein the anode active layer has a first layer comprising lithium metal and a multi-layer structure comprising single ion conducting layers and crosslinked polymer layers in contact with the first layer comprising lithium metal or in contact with an intermediate protective layer, such as a temporary protective metal layer, or plasma CO2 treatment layers on the surface of the lithium-containing first layer. The anodes of the current invention are particularly useful in electrochem. cells comprising sulfur-containing cathode active materials, such as elemental sulfur.

IT      10377-52-3, Lithium phosphate 184905-46-2, Lithium nitrogen phosphorus oxide

RL: TEM (Technical or engineered material use); USES (Uses)  
(glass; lithium anodes for electrochem. cells)

RN      10377-52-3      HCAPLUS

CN      Phosphoric acid, lithium salt (1:3)      (CA INDEX NAME)



● 3 Li

RN      184905-46-2      HCAPLUS

CN      Lithium nitrogen phosphorus oxide      (CA INDEX NAME)

Component		Ratio		Component
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		Registry Number
N	x	17778-88-0
O	x	17778-80-2
P	x	7723-14-0
Li	x	7439-93-2

IC ICM H01M004-02

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38IT 10377-52-3, Lithium phosphate 11115-95-0, Lithium niobium  
oxide 12627-14-4, Lithium silicate 12676-27-6 12769-51-6,  
Lithium tantalum oxide 37220-89-6, Lithium aluminate 39302-37-9,  
Lithium titanium oxide 152747-89-2, Lanthanum lithium oxide  
184905-46-2, Lithium nitrogen phosphorus oxide  
236388-73-1, Lithium silicide sulfide 236388-74-2, Lithium boride  
sulfide 236388-75-3, Aluminum lithium sulfide 236388-76-4,  
Lithium phosphide sulfide 342379-43-5, Germanium lithium sulfide  
RL: TEM (Technical or engineered material use); USES (Uses)  
(glass; lithium anodes for electrochem. cells)REFERENCE COUNT: 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR  
THIS RECORD. ALL CITATIONS AVAILABLE IN  
THE RE FORMAT

L30 ANSWER 13 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 2001:397238 HCAPLUS Full-text

DOCUMENT NUMBER: 135:7790

TITLE: Methods of preparing electrochemical cells

INVENTOR(S): Carlson, Steven A.

PATENT ASSIGNEE(S): Moltech Corporation, USA

SOURCE: PCT Int. Appl., 99 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 3

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2001039301	A2	20010531	WO 2000-US32140	200011 21

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WO 2001039301 A3 20020110

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH,  
CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH,  
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK,  
LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ,  
PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ,  
UA, UG, US, UZ, VN, YU, ZA, ZWRW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH,  
CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE,  
TR, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD,  
TG

AU 2001019270 A5 20010604 AU 2001-19270

200011  
21

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PRIORITY APPLN. INFO.:

US 1999-167149P

P

199911

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WO 2000-US32140

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21

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AB Provided are methods of preparing an anode/separator assembly for use in electrochem. cells in which a microporous separator **layer**, such as a microporous xerogel **layer**, is coated on a temporary carrier substrate, and an anode active **layer**, such as lithium metal, is then deposited on the separator **layer**, prior to removing the temporary carrier substrate from the separator **layer**. One or more **protective coating layers** may be coated before or after the coating step of the microporous separator **layer** and prior to depositing the anode active **layer**. Addnl. **layers**, including an edge insulating **layer**, an anode current collector **layer**, an electrode insulating **layer**, and a cathode current collector **layer**, may be applied subsequent to the coating step of the microporous separator **layer**. Also, provide are methods of preparing electrochem. cells utilizing anode/separator assemblies prepared by such methods, and anode/separator assemblies and electrochem. cells prepared by such methods.

IC ICM H01M004-00

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

IT Conducting polymers

(coatings; methods of preparing electrochem. cells)

L30 ANSWER 14 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 2001:397232 HCAPLUS Full-text

DOCUMENT NUMBER: 135:7784

TITLE: Methods of preparing a cathode/separator assembly for use in electrochemical cells

INVENTOR(S): Carlson, Steven A.

PATENT ASSIGNEE(S): Moltech Corporation, USA

SOURCE: PCT Int. Appl., 100 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 3

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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WO 2001039293	A2	20010531	WO 2000-US32231	200011 21

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WO 2001039293 A3 20020117

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW

RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG

AU 2001017965 A5 20010604 AU 2001-17965

200011

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US 7066971

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US 2002-148156

200209  
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PRIORITY APPLN. INFO.:

US 1999-167150P

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199911  
23

&lt;--

WO 2000-US32231

W

200011  
21

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AB Provided are methods of preparing a cathode/separator assembly for use in electrochem. cells in which a **protective coating layer**, such as a single ion **conducting layer**, is coated on a temporary carrier substrate, a microporous separator **layer** is then coated on the **protective coating layer**, and a cathode active **layer** is then coated on the separator **layer**, prior to removing the temporary carrier substrate from the **protective coating layer**. Addnl. **layers**, including an edge insulating **layer**, a cathode current collector **layer**, an electrode insulating **layer**, an anode current collector **layer**, an anode **layer** such as a lithium metal **layer**, and an anode **protective layer**, such as a single ion **conducting layer**, may be applied subsequent to the coating step of the microporous separator **layer**. Also, provided are methods of preparing electrochem. cells utilizing cathode/separator assemblies prepared by such methods, and cathode/separator assemblies and electrochem. cells prepared by such methods.

IC ICM H01M002-00

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 38

IT **Conducting** polymers

(coatings; methods of preparing cathode/separator assembly for use in electrochem. cells)

L30 ANSWER 15 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 2000:725905 HCAPLUS Full-text

DOCUMENT NUMBER: 133:269464

TITLE: Battery with an in-situ activation plated lithium anode

INVENTOR(S): Neudecker, Bernd J.; Dudney, Nancy J.; Bates, John B.

PATENT ASSIGNEE(S): Lockheed Martin Energy Research Corp., USA

SOURCE: PCT Int. Appl., 28 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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WO 2000060689	A1	20001012	WO 2000-US6997	200003 17

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US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM  
 RW: GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY,  
 DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF,  
 BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG  
 US 6168884 B1 20010102 US 1999-285326

199904  
 02

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PRIORITY APPLN. INFO.:

US 1999-285326

A1

199904  
 02

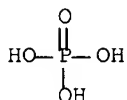
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AB A thin-film rechargeable battery includes: a cathode film including a lithium transition metal oxide, an electrolyte film coupled to the cathode film, the electrolyte film being substantially nonreactive with oxidizing materials and with metallic lithium, an anode current collector coupled to the electrolyte film; and an overlying layer coupled to the anode current collector. The thin-film rechargeable battery is activated during an initial charge by electrochem. plating of a metallic lithium anode between the anode current collector and the electrolyte film. The plating of the anode during charging and the stripping of the anode layer during discharging are essentially reversible. Therefore, almost no diminishment of discharge capacity occurs, even after many discharge and charge cycles. Other advantages include no need for special packaging for shipping and handling. The battery eliminates the main drawbacks of the thin-film Li-ion battery (high capacity loss during the initial charge) and of the thin-film lithium battery (high air-sensitivity at all times, temperature limited to .apprx.100°, expensive preparation of the lithium anode). The battery survives processing conditions that exceed those of a solder reflow process without any signs of degradation

IT 10377-52-3, Lithiumphosphate li3po4  
 RL: DEV (Device component use); USES (Uses)  
 (battery with in-situ activation plated lithium anode)

RN 10377-52-3 HCAPLUS

CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li

IT 184905-46-2, Lithium nitrogen phosphorus oxide  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (overlying layer coupled to anode grid; battery with  
 in-situ activation plated lithium anode)

RN 184905-46-2 HCAPLUS

CN Lithium nitrogen phosphorus oxide (CA INDEX NAME)

Component	Ratio	Component
		Registry Number
N	x	17778-88-0
O	x	17778-80-2
P	x	7723-14-0
Li	x	7439-93-2



IC ICM H01M010-36  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 IT Fluoropolymers, uses  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (overlying **layer** coupled to anode grid; battery with  
 in-situ activation plated lithium anode)  
 IT 7439-93-2, Lithium, uses 10377-52-3, Lithiumphosphate  
 li3po4 12031-65-1, Lithium nickel oxide linio2 12057-17-9,  
 Lithium manganese oxide limn2o4 12190-79-3, Cobalt lithium oxide  
 colio2  
 RL: DEV (Device component use); USES (Uses)  
 (battery with in-situ activation plated lithium anode)  
 IT 1304-28-5, Barium oxide bao, uses 1304-56-9, Beryllium oxide beo,  
 uses 1305-78-8, Calcium oxide cao, uses 1309-48-4, Magnesia,  
 uses 1312-81-8, Lanthana 1314-11-0, Strontium oxide sro, uses  
 1314-20-1, Thoria, uses 1314-36-9, Yttria, uses 7440-25-7,  
 Tantalum, uses 7440-33-7, Tungsten, uses 7440-41-7, Beryllium,  
 uses 7440-67-7, Zirconium, uses 7447-41-8, Lithium chloride,  
 uses 7550-35-8, Lithium bromide 7631-86-9, Silica, uses  
 7789-24-4, Lithium fluoride, uses 9002-84-0, Ptfe 9002-88-4  
 10043-11-5, Boron nitride bn, uses 10377-51-2, Lithium iodide  
 12033-76-0, Silicon nitride oxide si2n2o 12033-89-5, Silicon  
 nitride, uses 12060-08-1, Scandium oxide sc2o3 12169-03-8,  
 Lithium yttrium oxide liyo2 12209-15-3, Lithium scandium oxide  
 lisco2 12232-41-6, Beryllium lithium oxide be2li2o3 12355-58-7,  
 Aluminum lithium oxide alli5o4 12384-10-0, Lithium zirconium oxide  
 li8zro6 13453-84-4, Lithium silicate li4sio4 24304-00-5,  
 Aluminum nitride 25722-33-2, Parylene 39449-52-0, Lithium  
 silicate li8sio6 56320-64-0, Beryllium lithium oxide (BeLi4O3)  
 57349-02-7, Cerium lithium oxide celio2 184905-46-2,  
 Lithium nitrogen phosphorus oxide  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (overlying **layer** coupled to anode grid; battery with  
 in-situ activation plated lithium anode)  
 REFERENCE COUNT: 9 THERE ARE 9 CITED REFERENCES AVAILABLE FOR  
 THIS RECORD. ALL CITATIONS AVAILABLE IN  
 THE RE FORMAT

L30 ANSWER 16 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN  
 ACCESSION NUMBER: 2000:113026 HCAPLUS Full-text  
 DOCUMENT NUMBER: 132:125362  
 TITLE: Protective coatings for battery anodes  
 INVENTOR(S): Visco, Steven J.; Chu, May-Ying  
 PATENT ASSIGNEE(S): Polyplus Battery Company, Inc., USA  
 SOURCE: U.S., 18 pp., Cont.-in-part of U.S. 5,789,108.  
 CODEN: USXXAM  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 15  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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US 6025094	A	20000215	US 1998-86665	199805 29
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US 5523179	A	19960604	US 1994-344384	

				199411 23
			<--	
US 5582623	A	19961210	US 1995-479687	
				199506 07
			<--	
US 5686201	A	19971111	US 1996-686609	
				199607 26
			<--	
US 5789108	A	19980804	US 1997-814927	
				199703 11
			<--	
US 2001041294	A1	20011115	US 2001-901970	
				200107 09
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US 6723140	B2	20040420		
PRIORITY APPLN. INFO.:			US 1994-344384	A2
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			US 1995-479687	A2
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			<--	
			US 1996-686609	A2
				199607 26
			<--	
			US 1997-814927	A2
				199703 11
			<--	
			US 1998-86665	A
				199805 29
			<--	
			US 1998-139601	A
				199808 25
			<--	
			US 1998-139603	A1
				199808 25

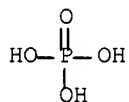
AB Disclosed is an alkali metal neg. electrode having a **protective layer**. Specifically, the disclosed neg. electrode includes a glassy or amorphous surface **protective layer** which **conducts** alkali metal ions but effectively blocks the alkali metal in the electrode from direct contact with the ambient. The **protective layer** has improved smoothness and reduced internal stress in comparison to prior **protective layers** such as those formed by sputtering. In a specific embodiment, the **protective layer** is formed on the **lithium metal** electrode surface by a plasma assisted deposition technique.

IT 10377-52-3, Lithium phosphate  $\text{Li}_3\text{PO}_4$  184905-46-2, Lithium nitrogen phosphorus oxide  
 RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)

(protective coatings for battery anodes)

RN 10377-52-3 HCAPLUS

CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li

RN 184905-46-2 HCAPLUS

CN Lithium nitrogen phosphorus oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
N	x	17778-88-0
O	x	17778-80-2
P	x	7723-14-0
Li	x	7439-93-2

IC ICM H01M004-58

INCL 429231950

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

IT 554-13-2, Lithium carbonate 1303-86-2, Boron oxide b2o3, uses  
 1314-80-3, Phosphorus pentasulfide 7631-86-9, Silica, uses  
 10377-51-2, Lithium iodide 10377-52-3, Lithium phosphate  
 li3po4 12057-24-8, Lithia, uses 12627-14-4, Lithium silicate  
 12676-27-6 26134-62-3, Lithium nitride 37220-89-6, Lithium  
 aluminate 184905-46-2, Lithium nitrogen phosphorus oxide  
 236388-73-1, Lithium silicide sulfide 236388-74-2, Lithium boride  
 sulfide 236388-75-3, Aluminum lithium sulfide 236388-76-4,  
 Lithium phosphide sulfide  
 RL: DEV (Device component use); TEM (Technical or engineered  
 material use); USES (Uses)

(protective coatings for battery anodes)

REFERENCE COUNT: 17 THERE ARE 17 CITED REFERENCES AVAILABLE  
 FOR THIS RECORD. ALL CITATIONS AVAILABLE  
 IN THE RE FORMAT

L30 ANSWER 17 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 1999:723300 HCAPLUS Full-text

DOCUMENT NUMBER: 131:312496

TITLE: Encapsulated lithium electrodes having glass  
**protective layers** and method  
 for their preparation

INVENTOR(S): Visco, Steve J.; Tsang, Floris Y.

PATENT ASSIGNEE(S): Polyplus Battery Company, Inc., USA

SOURCE: PCT Int. Appl., 33 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 15

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 9957770	A1	19991111	WO 1999-US6895	19990329
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RW: GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
US 6214061	B1	20010410	US 1998-139601	19980825
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CA 2330293	A1	19991111	CA 1999-2330293	19990329
<--				
AU 9933713	A	19991123	AU 1999-33713	19990329
<--				
AU 745287	B2	20020321		
EP 1093672	A1	20010425	EP 1999-915119	19990329
<--				
EP 1093672	B1	20040825		
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
BR 9910109	A	20011009	BR 1999-10109	19990329
<--				
JP 2002513991	T	20020514	JP 2000-547661	19990329
<--				
AT 274752	T	20040915	AT 1999-915119	19990329
<--				
US 6432584	B1	20020813	US 2000-678063	20001002
<--				
PRIORITY APPLN. INFO.:			US 1998-83947P	P 19980501
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			US 1998-139601	A 19980825
<--				
			WO 1999-US6895	W

199903

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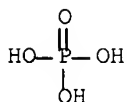
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AB A method for fabricating an active **metal** electrode involves depositing **lithium** or other active **metal** electrode on a **protective layer**. The **protective layer** is a glassy or amorphous material that **conducts** ions of the active metal. It may be deposited on a releasable web carrier or other substrate such as polymer electrolyte **layer**. Lithium is then deposited on the **protective layer**. Finally, a current collector is attached to the lithium.

IT 10377-52-3, Lithium phosphate 184905-46-2, Lithium nitrogen phosphorus oxide  
 RL: DEV (Device component use); USES (Uses)  
 (**protective layer** containing; encapsulated lithium electrodes having glass **protective layers** and method for their preparation)

RN 10377-52-3 HCAPLUS

CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li

RN 184905-46-2 HCAPLUS

CN Lithium nitrogen phosphorus oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
N	x	17778-88-0
O	x	17778-80-2
P	x	7723-14-0
Li	x	7439-93-2

IC ICM H01M004-02  
 ICS H01M004-04; H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 38

IT Secondary batteries  
 (Li-S; encapsulated lithium electrodes having glass **protective layers** and method for their preparation)

IT Battery anodes  
 Encapsulation  
 Polymer electrolytes  
 (encapsulated lithium electrodes having glass **protective layers** and method for their preparation)

IT Polyethers, uses  
 Polymers, uses  
 Polyphosphazenes  
 Polythioethers  
 RL: DEV (Device component use); USES (Uses)  
 (gel electrolyte containing; encapsulated lithium electrodes having glass **protective layers** and method for their preparation)

- IT Polyoxyalkylenes, uses  
 RL: DEV (Device component use); USES (Uses)  
 (gel or solid electrolyte containing; encapsulated lithium electrodes having glass **protective layers** and method for their preparation)
- IT Battery electrolytes  
 (gel; encapsulated lithium electrodes having glass **protective layers** and method for their preparation)
- IT Imines  
 RL: DEV (Device component use); USES (Uses)  
 (polyimines, gel electrolyte containing; encapsulated lithium electrodes having glass **protective layers** and method for their preparation)
- IT 7440-02-0, Nickel, uses 12597-68-1, Stainless steel, uses  
 RL: DEV (Device component use); USES (Uses)  
 (current collector; encapsulated lithium electrodes having glass **protective layers** and method for their preparation)
- IT 7439-93-2, Lithium, uses  
 RL: DEV (Device component use); USES (Uses)  
 (encapsulated lithium electrodes having glass **protective layers** and method for their preparation)
- IT 10377-52-3, Lithium phosphate 12627-14-4, Lithium silicate 12676-27-6 37220-89-6, Lithium aluminate **184905-46-2**, Lithium nitrogen phosphorus oxide 236388-73-1, Lithium silicide sulfide 236388-74-2, Lithium boride sulfide 236388-75-3, Aluminum Lithium sulfide 236388-76-4, Lithium phosphide sulfide  
 RL: DEV (Device component use); USES (Uses)  
 (**protective layer** containing; encapsulated lithium electrodes having glass **protective layers** and method for their preparation)
- IT 7429-90-5, Aluminum, uses 7439-89-6, Iron, uses 7440-31-5, Tin, uses 7440-50-8, Copper, uses 7440-66-6, Zinc, uses  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (releasable web carrier; encapsulated lithium electrodes having glass **protective layers** and method for their preparation)

REFERENCE COUNT: 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L30 ANSWER 18 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN  
 ACCESSION NUMBER: 1999:549496 HCAPLUS Full-text  
 DOCUMENT NUMBER: 131:146969  
 TITLE: Plating metal anodes under protective coatings for use in batteries  
 INVENTOR(S): Chu, May-Ming; Visco, Steven J.; De Jonghe, Lutgard C.  
 PATENT ASSIGNEE(S): Polyplus Battery Company, Inc., USA  
 SOURCE: PCT Int. Appl., 40 pp.  
 CODEN: PIXXD2  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 15  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE °
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WO 9943034	A1	19990826	WO 1999-US3335	199902

17

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W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ,  
 DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN,  
 IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD,  
 MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI,  
 SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW  
 RW: GH, GM, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, CY, DE, DK,  
 ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF,  
 CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG

US 6402795                      B1            20020611            US 1998-139603

199808  
25

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CA 2322131                      A1            19990826            CA 1999-2322131

199902  
17

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AU 9932959                      A            19990906            AU 1999-32959

199902  
17

<--

AU 743685                      B2            20020131  
 BR 9908010                      A            20001024            BR 1999-8010

199902  
17

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EP 1057222                      A1            20001206            EP 1999-934368

199902  
17

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R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC,  
 PT, IE, LV, FI  
 JP 2002504741                      T            20020212            JP 2000-532875

199902  
17

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PRIORITY APPLN. INFO.:                      US 1998-75017P            P

199802  
18

<--

US 1998-139603                      A

199808  
25

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WO 1999-US3335                      W

199902  
17

<--

AB    A method for forming lithium electrodes having **protective layers** involves plating lithium between a lithium ion **conductive protective layer** and a current collector of an electrode precursor. The electrode precursor is formed by depositing the **protective layer** on a very smooth surface of a current collector. The **protective layer** is a glass such as lithium phosphorus oxynitride and the current collector is a **conductive** sheet such as a copper sheet. During plating, lithium ions move through the **protective layer** and a **lithium metal layer** plates onto the surface of the current collector. The resulting structure is a protected lithium electrode. To facilitate uniform lithium plating, the electrode precursor may include a wetting **layer** which coats the current collector.

IT    7439-93-2, Lithium, uses

RL: DEV (Device component use); FMU (Formation, unclassified); FORM (Formation, nonpreparative); USES (Uses)  
(plating **metal** anodes under protective coatings for use in batteries)

RN 7439-93-2 HCAPLUS

CN Lithium (CA INDEX NAME)

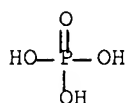
Li

IT 10377-52-3, Lithium phosphate 184905-46-2, Lithium nitrogen phosphorus oxide

RL: TEM (Technical or engineered material use); USES (Uses)  
(**protective layer**; plating metal anodes under protective coatings for use in batteries)

RN 10377-52-3 HCAPLUS

CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●<sup>3</sup> Li

RN 184905-46-2 HCAPLUS

CN Lithium nitrogen phosphorus oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
N	x	17778-88-0
O	x	17778-80-2
P	x	7723-14-0
Li	x	7439-93-2

IC ICM H01M004-04

ICS H01M004-12; H01M010-36; H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

IT Primary batteries

Secondary batteries

(**lithium**; plating **metal** anodes under protective coatings for use in batteries)

IT 7429-90-5, Aluminum, uses 7439-92-1, Lead, uses 7439-95-4, Magnesium, uses 7440-21-3, Silicon, uses 7440-22-4, Silver, uses 7440-31-5, Tin, uses 7440-44-0, Carbon, uses 11126-12-8, Iron sulfide 12673-92-6, Titanium sulfide

RL: TEM (Technical or engineered material use); USES (Uses)  
(anode precursor, wetting **layer** material; plating metal anodes under protective coatings for use in batteries)

IT 7439-93-2, **Lithium**, uses

RL: DEV (Device component use); FMU (Formation, unclassified); FORM (Formation, nonpreparative); USES (Uses)  
(plating **metal** anodes under protective coatings for use



in batteries)  
 IT 74432-42-1, Lithium polysulfide 236388-74-2,  
 Lithium boride sulfide 236388-76-4, Lithium  
 phosphide sulfide  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (plating **metal** anodes under protective coatings for use  
 in batteries)  
 IT 10377-52-3, Lithium phosphate 12627-14-4, Lithium silicate  
 12676-27-6 37220-89-6, Lithium aluminate 184905-46-2,  
 Lithium nitrogen phosphorus oxide 236388-73-1, Lithium silicide  
 sulfide 236388-75-3, Aluminum lithium sulfide  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (**protective layer**; plating metal anodes under  
 protective coatings for use in batteries)  
 REFERENCE COUNT: 6 THERE ARE 6 CITED REFERENCES AVAILABLE FOR  
 THIS RECORD. ALL CITATIONS AVAILABLE IN  
 THE RE FORMAT

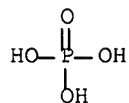
L30 ANSWER 19 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN  
 ACCESSION NUMBER: 1999:147847 HCAPLUS Full-text  
 DOCUMENT NUMBER: 130:170658  
 TITLE: Electrode-electrolyte unit and its production  
 and use in thin-film battery and electrochromic  
 device  
 INVENTOR(S): Weppner, Werner; Birke, Peter  
 PATENT ASSIGNEE(S): Germany  
 SOURCE: Ger. Offen., 14 pp.  
 CODEN: GWXXBX  
 DOCUMENT TYPE: Patent  
 LANGUAGE: German  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
DE 19735803	A1	19990225	DE 1997-19735803	199708 18
			<--	
DE 19735803	B4	20061019	DE 1997-19735803	199708 18

PRIORITY APPLN. INFO.: DE 1997-19735803

AB The unit includes an electrode of a **conducting** ions-forming element, such as Li,  
 and a transition **metal**-containing oxide, sulfide, nitride, fluoride, chloride,  
 and/or carbide; or an alloy of a **conducting** ion-forming element; and an  
 electrolyte of a **conducting** ions-forming element, such as Li, and a main group  
 element- and/or transition metal-containing oxide, sulfide, nitride, fluoride,  
 and/or chloride. The fabrication efficiency and the elec. properties of the unit  
 can be improved by providing a **conducting** ions- **conducting** intermediate **layer**  
 between the electrode and the electrolyte and/or by simultaneous insertion of the  
**conducting** ions-forming element into the cathode material and by oxidizing the  
 electrolyte by closing and outer plasma-including current circuit.  
 IT 10377-52-3P, Trilithium phosphate  
 RL: DEV (Device component use); PNU (Preparation, unclassified);  
 PREP (Preparation); USES (Uses)  
 (in electrode-electrolyte unit for use in thin-film battery and  
 electrochromic device)

RN 10377-52-3 HCAPLUS  
 CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li

IT 184905-46-2, Lithium nitrogen phosphorus oxide  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (in electrode-electrolyte unit for use in thin-film battery and electrochromic device)  
 RN 184905-46-2 HCAPLUS  
 CN Lithium nitrogen phosphorus oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
N	x	17778-88-0
O	x	17778-80-2
P	x	7723-14-0
Li	x	7439-93-2

IC ICM H01M010-02  
 ICS C23C016-50; G09F009-35; G02F001-153  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 74  
 IT 1314-35-8DP, Tungsten oxide (WO<sub>3</sub>), lithiated, uses  
 10377-52-3P, Trilithium phosphate 12031-66-2P, Lithium  
 tantalum oxide (LiTaO<sub>3</sub>) 52627-24-4P, Cobalt lithium oxide  
 RL: DEV (Device component use); PNU (Preparation, unclassified);  
 PREP (Preparation); USES (Uses)  
 (in electrode-electrolyte unit for use in thin-film battery and electrochromic device)  
 IT 17372-42-8 184905-46-2, Lithium nitrogen phosphorus oxide  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (in electrode-electrolyte unit for use in thin-film battery and electrochromic device)

L30 ANSWER 20 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN  
 ACCESSION NUMBER: 1996:737949 HCAPLUS Full-text  
 DOCUMENT NUMBER: 126:39466  
 TITLE: Organic thin-film light-emitting device  
 INVENTOR(S): Nanba, Noryoshi; Nakatani, Kenji; Arai, Michio  
 PATENT ASSIGNEE(S): Tdk Electronics Co Ltd, Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 11 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 08264279

A

19961011

JP 1995-93023

199503  
27

PRIORITY APPLN. INFO.:

<--  
JP 1995-93023199503  
27

AB In the device comprising a substrate successively laminated with, from the bottom, 1st electrode, an electron-transporting **layer** and a light-emitting **layer**, 2nd transparent electrode, and a **protective layer**; the 1st electrode is made of an elec. **conductive** C interlayer compound containing a metal of work function  $\leq 3.0\text{eV}$ . The cathode may be hardly graphitizable C containing Li. The device high electron-injecting efficiency.

IT 7439-93-2, Lithium, uses

RL: MOA (Modifier or additive use); USES (Uses)  
(carbon interlayer compound containing; organic thin-film light-emitting device having cathodes of **metal**-containing carbonaceous interlayer compound)

RN 7439-93-2 HCAPLUS

CN Lithium (CA INDEX NAME)

Li

IC ICM H05B033-26

CC 73-11 (Optical, Electron, and Mass Spectroscopy and Other Related Properties)

IT 7439-93-2, Lithium, uses 7440-09-7, Potassium, uses  
7440-19-9, Samarium, uses 7440-23-5, Sodium, uses 7440-46-2,  
Cesium, uses 7440-53-1, Europium, uses

RL: MOA (Modifier or additive use); USES (Uses)  
(carbon interlayer compound containing; organic thin-film light-emitting device having cathodes of **metal**-containing carbonaceous interlayer compound)

L30 ANSWER 21 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 1994:461539 HCAPLUS Full-text

DOCUMENT NUMBER: 121:61539

TITLE: Protective lithium ion **conducting**  
ceramic coating for **lithium**  
**metal** anodes

INVENTOR(S): Bates, John B.

PATENT ASSIGNEE(S): Martin Marietta Energy Systems, Inc., USA

SOURCE: U.S., 4 pp.

CODEN: USXXAM

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 5314765	A	19940524	US 1993-137285	199310 14

PRIORITY APPLN. INFO.:

<--  
US 1993-137285199310  
14

&lt;--

AB In a battery including a cathode, a lithium anode and an electrolyte between the anode and cathode, a thin-film of lithium phosphorus oxynitride is used to coat the anode and sep. it from the electrolyte. A preliminary **layer** of lithium nitride may be coated on the anode before the lithium phosphorous oxynitride is coated on the anode so that separation of the anode and electrolyte is further enhanced. By coating the lithium anode with this material lay-up, the life of the battery is lengthened and the performance of the battery is enhanced.

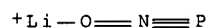
IT 150272-61-0

RL: USES (Uses)

(lithium anode coating with)

RN 150272-61-0 HCAPLUS

CN Lithium(1+), (phosphorous nitride N-oxide-O)- (9CI) (CA INDEX NAME)



IC ICM H01M010-40

INCL 429194000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

IT 26134-62-3, Lithium nitride 150272-61-0

RL: USES (Uses)

(lithium anode coating with)

L30 ANSWER 22 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 1992:259053 HCAPLUS Full-text

DOCUMENT NUMBER: 116:259053

TITLE: Secondary batteries with coated anodes

INVENTOR(S): Nakane, Ikuro; Fujita, Yasuhiro; Furukawa, Sanehiro

PATENT ASSIGNEE(S): Sanyo Electric Co., Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 7 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
-----	----	-----	-----	
JP 04028172	A	19920130	JP 1990-131673	199005 22

&lt;--

JP 3030053 B2 20000410

PRIORITY APPLN. INFO.:

JP 1990-131673

199005  
22

&lt;--

AB The batteries use MnO<sub>2</sub>, MoO<sub>3</sub>, V<sub>2</sub>O<sub>5</sub>, or TiS<sub>2</sub> cathodes and alkali **metal** (e.g., Li), alkaline earth **metal**, or Al anodes, which are coated with a 1st **protective layer** and an elastomer-, **conducting** polymer-, or ion-**conductive** polymer-based **layer**. The 1st **layer** may be salts, oxides, or hydroxides of alkali or alkaline earth

metals or compds. of P, As, Sb, and/or Bi, the elastomer may be ethylene-propylene or ethylene-propylene-nonconjugated diene copolymers, the **conducting** polymer may be poly(p-phenylene), polyacetylene, polyaniline, polypyrrole, etc., and the ion-**conductive** polymer may be PEO or other polymers containing dispersed Li salts. These batteries have long cycle life.

IC ICM H01M010-40

ICS H01M004-02

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

L30 ANSWER 23 OF 23 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 1986:450872 HCAPLUS Full-text

DOCUMENT NUMBER: 105:50872

TITLE: Inert electrode composition having agent for controlling oxide growth on electrode made therefrom

INVENTOR(S): Ray, Siba P.

PATENT ASSIGNEE(S): Aluminum Co. of America, USA

SOURCE: U.S., 14 pp. Cont.-in-part of U.S. Ser. No 596,020.

CODEN: USXXAM

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 8

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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US 4582585	A	19860415	US 1984-682909	198412 18
			<--	
US 4454015	A	19840612	US 1982-423673	198209 27
			<--	
US 4584172	A	19860422	US 1984-596020	198405 03
			<--	
PRIORITY APPLN. INFO.:			US 1982-423673	A3 198209 27
			<--	
			US 1984-596020	A2 198405 03
			<--	

AB An inert electrode composition is described, which is suitable for use as an inert electrode in the production of metals, such as Al, by the electrolytic reduction of a metal oxide or metal salt dissolved in a molten salt bath. The composition comprises  $\geq 1$  metal alloy and metal compound, which may include oxides of the metals (e.g. Ni-Fe) comprising the alloy. The alloy and metal compds are interwoven in a network which provides improved elec. **conductivity** and mech. strength while preserving the level of chemical inertness necessary for such an electrode to function satisfactorily. The electrode composition further includes a metal compound dopant (e.g., Al<sub>2</sub>O<sub>3</sub>) which aids in controlling the thickness of a **protective oxide layer** on at least the bottom portion of an electrode made from the composition during use.

IT 7439-93-2, uses and miscellaneous

RL: USES (Uses)

(dopants, for control of oxide formation in inert electrodes for  
**metal** electroprodn. in salt melts)

RN 7439-93-2 HCAPLUS

CN Lithium (CA INDEX NAME)

Li

IC ICM C25C003-00

ICS C25B011-04

INCL 204243000R

CC 72-9 (Electrochemistry)

IT **7439-93-2**, uses and miscellaneous 7439-95-4, uses and  
miscellaneous 7439-96-5, uses and miscellaneous 7440-03-1, uses  
and miscellaneous 7440-21-3, uses and miscellaneous 7440-25-7,  
uses and miscellaneous 7440-31-5, uses and miscellaneous  
7440-32-6, uses and miscellaneous 7440-47-3, uses and  
miscellaneous 7440-48-4, uses and miscellaneous 7440-50-8, uses  
and miscellaneous 7440-65-5, uses and miscellaneous 7440-67-7,  
uses and miscellaneous 7440-70-2, uses and miscellaneous

RL: USES (Uses)

(dopants, for control of oxide formation in inert electrodes for  
**metal** electroprodn. in salt melts)

=>

JP 61263069

A

19861121

JP 1985-105109

198505

17

PRIORITY APPLN. INFO.:

JP 1985-105109

198505

17

AB The long storage-life batteries without explosion and electrolyte leakage have anodes of a Li-intercalated transition **metal** oxide coated with a Li ion-conducting solid (Li<sub>3</sub>PO<sub>4</sub> + Li<sub>4</sub>SiO<sub>4</sub>, LiTaO<sub>3</sub>, or LiACF<sub>4</sub>). The oxide is selected from oxides of W, Mo, Ti, Ta, and V. A composite of WO<sub>3</sub>-C cathode, 1M LiClO<sub>4</sub> in propylene carbonate electrolyte, and a vacuum-deposited WO<sub>3</sub> **layer** sputtered with a 2-μ LiTaO<sub>3</sub> **layer** were assembled. Li was intercalated into the WO<sub>3</sub> **layer** by short circuiting the **layer** with Li in an organic electrolyte for 1 wk to form an anode. The battery showed an open-circuit voltage of 2.8 V and a 10% capacity decrease after 200 charge-discharge cycles. No explosion or electrolyte leakage was observed. A control battery having an anode without the LiTaO<sub>3</sub> **layer** showed 80% capacity decrease after 50 cycles, and electrolyte leakage was observed.

IT 10377-52-3, Trilithium phosphate

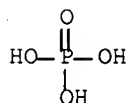
RL: USES (Uses)

(anodes with surface **layer** of, lithium

-intercalated **metal** oxide, for nonaq.-electrolyte batteries)

RN 10377-52-3 HCAPLUS

CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●<sub>3</sub> Li

IC ICM H01M010-40

ICS H01M010-36

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 72

IT Anodes

(battery, lithium-intercalated **metal** oxide,  
with ion-conducting surface **layer**)

IT 1313-27-5, Molybdenum oxide (MoO<sub>3</sub>), properties 1314-35-8, Tungsten  
oxide (WO<sub>3</sub>), properties 1314-61-0 1314-62-1, Vanadium oxide  
(V<sub>2</sub>O<sub>5</sub>), properties 13463-67-7, Titanium dioxide, properties

RL: PRP (Properties)

(anodes from lithium-intercalated, with ion conducting surface  
**layer**, for nonaq.-electrolyte batteries)

IT 10377-52-3, Trilithium phosphate 12031-66-2, Lithium  
tantalum oxide (LiTaO<sub>3</sub>) 13453-84-4, Tetralithium silicate

RL: USES (Uses)

(anodes with surface **layer** of, lithium

-intercalated **metal** oxide, for nonaq.-electrolyte  
batteries)

=>

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DICTIONARY FILE UPDATES: 6 MAY 2007 HIGHEST RN 934336-20-6

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(FILE 'HOME' ENTERED AT 12:06:02 ON 07 MAY 2007)

FILE 'REGISTRY' ENTERED AT 12:06:20 ON 07 MAY 2007

L1	1	SEA	ABB=ON	PLU=ON	7439-93-2/RN
L2	9750	SEA	ABB=ON	PLU=ON	(LI(L)P(L)O)/ELS
L3	105	SEA	ABB=ON	PLU=ON	L2(L)H/ELS (L) 4/ELC.SUB
L4	69	SEA	ABB=ON	PLU=ON	L2(L)N/ELS (L) 4/ELC.SUB
L5	20	SEA	ABB=ON	PLU=ON	L2(L)3/ELC.SUB

FILE 'HCAPLUS' ENTERED AT 12:28:41 ON 07 MAY 2007

L6	4889	SEA	ABB=ON	PLU=ON	L1(L)METAL?
L7		QUE	ABB=ON	PLU=ON	(LITHIUM OR LI) (3A)METAL?
L8	2014	SEA	ABB=ON	PLU=ON	L3 OR L5
L9	181	SEA	ABB=ON	PLU=ON	L4
L10		QUE	ABB=ON	PLU=ON	LAYER? OR OVERLAY?
L11	141	SEA	ABB=ON	PLU=ON	(L6 OR L7) AND L8
L12	33	SEA	ABB=ON	PLU=ON	L11 AND L10
L13	31	SEA	ABB=ON	PLU=ON	L11 AND L9
L14	17	SEA	ABB=ON	PLU=ON	L13 AND L10
L15		QUE	ABB=ON	PLU=ON	THICK?
L16	4	SEA	ABB=ON	PLU=ON	L14 AND L15
L17	6	SEA	ABB=ON	PLU=ON	L12 AND L15
L18	6	SEA	ABB=ON	PLU=ON	L16 OR L17
L19	27	SEA	ABB=ON	PLU=ON	(L12 OR L14) NOT L18

=> fil hcap

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FILE COVERS 1907 - 7 May 2007 VOL ISS ISS

FILE LAST UPDATED: 6 May 2007 (20070506/ED)

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FILE COVERS 1907 - 7 May 2007 VOL 146 ISS 20

FILE LAST UPDATED: 1 May 2007 (20070501/ED)

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This file contains CAS Registry Numbers for easy and accurate

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L18 ANSWER 1 OF 6 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 2006:301567 HCAPLUS Full-text

DOCUMENT NUMBER: 144:334260

TITLE: Composition precursor for aluminum-containing lithium transition metal oxide and process for preparation of the same

INVENTOR(S): Paulsen, Jens M.; Kwon, Yonghoon; Jang, Jaeup; Park, Hong-Kyu

PATENT ASSIGNEE(S): Lg Chem, Ltd., S. Korea

SOURCE: PCT Int. Appl., 30 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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WO 2006033525	A1	20060330	WO 2005-KR2951	20050906
W:	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KP, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW			
RW:	AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG, BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM			
US 2006068289	A1	20060330	US 2004-950105	20040924
PRIORITY APPLN. INFO.:			US 2004-950105	A

200409

24

- AB The present invention provides a powdery composite precursor, which comprises a core of a lithium transition metal oxide, and an aluminum hydroxide-based precipitate layer coated on the surface of the core, and a process to prepare the composite precursor. The preparation process comprises the formation of a water based slurry by dispersing lithium transition metal oxide powder in water, and a precipitation reaction of an aluminum salt solution with a base solution where the lithium transition metal particles act as seed particles, whereby a mech. stable precipitate layer of homogeneous thickness can be achieved. The composite precursor can be converted into aluminum-containing, e.g., aluminum-doped, lithium transition metal oxide suitable for a cathode active material of lithium rechargeable battery by heat treatment.
- IT 13762-75-9, Lithium metaphosphate  
 RL: MOA (Modifier or additive use); USES (Uses)  
 (process for preparation of composition precursor for aluminum-containing lithium transition metal oxide)
- RN 13762-75-9 HCAPLUS
- CN Metaphosphoric acid (HPO3), lithium salt (8CI, 9CI) (CA INDEX NAME)



● Li

ONE OR MORE TAUTOMERIC DOUBLE BONDS NOT DISPLAYED IN THE STRUCTURE

- IC ICM H01M004-58
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 49
- ST battery cathode aluminum lithium transition metal  
 oxide composite precursor
- IT Transition metal oxides  
 RL: CPS (Chemical process); PEP (Physical, engineering or chemical  
 process); PROC (Process)  
 (lithium-conth.; process for preparation of composition precursor  
 for aluminum-containing lithium transition metal  
 oxide)
- IT Secondary batteries  
 (lithium; process for preparation of composition precursor for  
 aluminum-containing lithium transition metal  
 oxide)
- IT Battery cathodes  
 Heat treatment  
 (process for preparation of composition precursor for aluminum-containing  
 lithium transition metal oxide)
- IT 7429-90-5, Aluminum, uses  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (coating; process for preparation of composition precursor for  
 aluminum-containing lithium transition metal  
 oxide)
- IT 497-19-8, Sodium carbonate, processes 506-87-6, Ammonium carbonate  
 554-13-2, Lithium carbonate 1310-58-3, Potassium hydroxide,  
 processes 1310-65-2, Lithium hydroxide 1310-73-2, Sodium  
 hydroxide, processes 1336-21-6, Ammonium hydroxide 7429-90-5D,  
 Aluminum, salt 7786-81-4, Nickel sulfate 10024-42-7, Aluminum

sodium sulfate 10043-01-3, Aluminum sulfate 10124-43-3, Cobalt sulfate 15007-61-1, Aluminum potassium sulfate 21645-51-2, Aluminum hydroxide, processes  
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)

(process for preparation of composition precursor for aluminum-containing lithium transition metal oxide)

IT 183451-80-1 227623-80-5, Cobalt lithium manganese nickel oxide (Co<sub>0.8</sub>LiMn<sub>0.1</sub>Ni<sub>0.1</sub>O<sub>2</sub>) 352197-83-2

RL: DEV (Device component use); USES (Uses)

(process for preparation of composition precursor for aluminum-containing lithium transition metal oxide)

IT 13762-75-9, Lithium metaphosphate 13821-20-0, Aluminum lithium fluoride all<sub>3</sub>f<sub>6</sub>

RL: MOA (Modifier or additive use); USES (Uses)

(process for preparation of composition precursor for aluminum-containing lithium transition metal oxide)

IT 150607-28-6P 880762-58-3P, Aluminum lithium sulfate (Al<sub>0.7</sub>Li<sub>0.3</sub>(SO<sub>4</sub>)<sub>1.2</sub>)

RL: SPN (Synthetic preparation); PREP (Preparation)

(process for preparation of composition precursor for aluminum-containing lithium transition metal oxide)

REFERENCE COUNT: 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L18 ANSWER 2 OF 6 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 2006:269693 HCAPLUS Full-text

DOCUMENT NUMBER: 144:295967

TITLE: Metal-air battery with ion-conducting inorganic glass electrolyte

INVENTOR(S): Jang, Bor Z.

PATENT ASSIGNEE(S): USA

SOURCE: U.S. Pat. Appl. Publ., 9 pp.

CODEN: USXXCO

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
-----	----	-----	-----	
US 2006063051	A1	20060323	US 2004-944667	20040920
				20040920

PRIORITY APPLN. INFO.: US 2004-944667

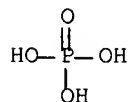
AB The invention concerns a solid-state metal-air electrochem. cell comprising: (a) a metal-containing electroactive anode; (b) an oxygen electroactive cathode; and (c) an ion-conducting glass electrolyte disposed between the metal-containing anode and the oxygen electroactive cathode. The cathode active material, which is oxygen gas, is not stored in the battery but rather fed from the environment. The oxygen cathode is preferably a composite carbon electrode which serves as the cathode current collector on which oxygen mols. are reduced during discharge of the battery to generate elec. current. The glass electrolyte typically has an ion conductivity in the range of  $5 \times 10^{-5}$  to  $2 \times 10^{-3}$  S/cm. The electrolyte layer is preferably smaller than 10  $\mu$ m in thickness and further preferably smaller than 1

µm. The anode metal is preferably lithium or lithium alloy, but may be selected from other elements such as sodium, magnesium, calcium, aluminum and zinc.

IT 7439-93-2, Lithium, uses 10377-52-3,  
Lithium phosphate 184905-46-2, Lithium  
nitrogen phosphorus oxide  
RL: DEV (Device component use); USES (Uses)  
(metal-air battery with ion-conducting inorg. glass  
electrolyte)  
RN 7439-93-2 HCAPLUS  
CN Lithium (CA INDEX NAME)

Li

RN 10377-52-3 HCAPLUS  
CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li

RN 184905-46-2 HCAPLUS  
CN Lithium nitrogen phosphorus oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
N	x	17778-88-0
O	x	17778-80-2
P	x	7723-14-0
Li	x	7439-93-2

INCL 429029000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 57

IT Borate glasses  
RL: DEV (Device component use); USES (Uses)  
(lithium borate; metal-air battery with  
ion-conducting inorg. glass electrolyte)  
IT Phosphate glasses  
RL: DEV (Device component use); USES (Uses)  
(lithium phosphate; metal-air battery with  
ion-conducting inorg. glass electrolyte)  
IT Silicate glasses  
RL: DEV (Device component use); USES (Uses)  
(lithium silicate; metal-air battery with  
ion-conducting inorg. glass electrolyte)  
IT Glass, uses  
RL: DEV (Device component use); USES (Uses)  
(lithium silicon borate sulfide; metal-air  
battery with ion-conducting inorg. glass electrolyte)

IT Glass, uses  
 RL: DEV (Device component use); USES (Uses)  
 (lithium silicon phosphate sulfide; metal-air  
 battery with ion-conducting inorg. glass electrolyte)

IT Glass, uses  
 RL: DEV (Device component use); USES (Uses)  
 (lithium silicon silicate sulfide; metal-air  
 battery with ion-conducting inorg. glass electrolyte)

IT Lithium alloy, base  
 RL: DEV (Device component use); USES (Uses)  
 (metal-air battery with ion-conducting inorg. glass  
 electrolyte)

IT 12136-58-2, Lithium sulfide (Li<sub>2</sub>S) 13759-10-9, Silicon  
 sulfide (SiS<sub>2</sub>)  
 RL: DEV (Device component use); USES (Uses)  
 (glass; metal-air battery with ion-conducting inorg.  
 glass electrolyte)

IT 7429-90-5, Aluminum, uses 7439-89-6, Iron, uses 7439-93-2  
 , Lithium, uses 7439-95-4, Magnesium, uses 7439-96-5,  
 Manganese, uses 7440-02-0, Nickel, uses 7440-09-7, Potassium,  
 uses 7440-17-7, Rubidium, uses 7440-23-5, Sodium, uses  
 7440-24-6, Strontium, uses 7440-32-6, Titanium, uses 7440-39-3,  
 Barium, uses 7440-41-7, Beryllium, uses 7440-44-0, Carbon, uses  
 7440-46-2, Cesium, uses 7440-47-3, Chromium, uses 7440-66-6,  
 Zinc, uses 7440-70-2, Calcium, uses 10377-52-3,  
 Lithium phosphate 11102-77-5 12627-14-4, Lithium  
 silicate 12676-27-6 12798-95-7 37186-88-2 37220-89-6,  
 Lithium aluminate 39300-27-1 53680-59-4 65777-94-8  
 184905-46-2, Lithium nitrogen phosphorus oxide  
 236388-73-1, Lithium silicide sulfide 236388-75-3,  
 Aluminum lithium sulfide 236388-76-4, Lithium  
 phosphide sulfide  
 RL: DEV (Device component use); USES (Uses)  
 (metal-air battery with ion-conducting inorg. glass  
 electrolyte)

IT 178958-56-0P, Lithium silicon oxide  
 RL: DEV (Device component use); SPN (Synthetic preparation); PREP  
 (Preparation); USES (Uses)  
 (metal-air battery with ion-conducting inorg. glass  
 electrolyte)

L18 ANSWER 3 OF 6 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 2004:391728 HCAPLUS Full-text

DOCUMENT NUMBER: 140:378090

TITLE: Anodes for lithium-sulfur batteries, their  
 manufacture, and lithium-sulfur batteries using  
 them

INVENTOR(S): Lee, Jong Ki; Lee, Je Won; Cho, Joung Keun; Lee,  
 Sang Muk; Kim, Min Hyup

PATENT ASSIGNEE(S): Samsung SDI Co., Ltd., S. Korea

SOURCE: Jpn. Kokai Tokkyo Koho, 9 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 2004139968	A	20040513	JP 2003-276606	200307 18
KR 2004035100	A	20040429	KR 2002-63834	200210 18
US 2004137330	A1	20040715	US 2003-688781	200310 17
CN 1508893	A	20040630	CN 2003-10123734	200310 18
PRIORITY APPLN. INFO.:			KR 2002-63834	A 200210 18

AB The anodes for lithium-sulfur batteries are manufactured by forming a pretreatment **layer** (thickness 50-5000 Å) containing Li<sup>+</sup>-conductive substances having ionic conductivity  $\geq 1 + 10^{-10}$  S/cm on Li metal by vapor deposition under inert gas atmospheric and forming a Li metal-protective film by vapor deposition. Preferably, the Li<sup>+</sup>-conductive substance may be Li<sub>3</sub>PO<sub>4</sub> and the protective **layer** contains Li<sub>2.9</sub>PO<sub>3.3</sub>N<sub>0.46</sub>. Lithium-sulfur batteries contain the anodes above and cathodes containing cathode active materials selected from S element, S-series compds., and their mixts. The anode pretreatment **layer** shows high ionic conductivity and no volume expansion.

IT 7439-93-2, Lithium, uses

RL: DEV (Device component use); USES (Uses)  
(manufacture of lithium-sulfur battery anodes having Li<sup>+</sup>-conductive pretreatment **layer** and Li metal-protective **layer**)

RN 7439-93-2 HCAPLUS

CN Lithium (CA INDEX NAME)

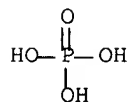
Li

IT 10377-52-3, Lithium phosphate

RL: DEV (Device component use); USES (Uses)  
(pretreatment **layer**; manufacture of lithium-sulfur battery anodes having Li<sup>+</sup>-conductive pretreatment **layer** and Li metal-protective **layer**)

RN 10377-52-3 HCAPLUS

CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li

IT 150499-39-1, Lithium metaphosphate nitride oxide  
(Li<sub>2.9</sub>(PO<sub>3</sub>)N<sub>0.46</sub>O<sub>0.3</sub>)

RL: DEV (Device component use); USES (Uses)

(protective **layer**; manufacture of lithium-sulfur battery anodes having Li+-conductive pretreatment **layer** and Li metal-protective **layer**)

RN 150499-39-1 HCAPLUS

CN Lithium metaphosphate nitride oxide (Li<sub>2.9</sub>(PO<sub>3</sub>)N<sub>0.4600.3</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
N	0.46	17778-88-0
O	0.3	17778-80-2
O3P	1	15389-19-2
Li	2.9	7439-93-2

IC ICM H01M004-02

ICS H01M004-04; H01M004-40; H01M004-62; H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 72

IT Controlled atmospheres

(inert, in vapor deposition; manufacture of lithium-sulfur battery anodes having Li+-conductive pretreatment **layer** and Li metal-protective **layer**)

IT Secondary batteries

(lithium-sulfur; manufacture of lithium-sulfur battery anodes having Li+-conductive pretreatment **layer** and Li metal-protective **layer**)

IT Battery anodes

Battery cathodes

Ionic conductors

Vapor deposition process

(manufacture of lithium-sulfur battery anodes having Li+-conductive pretreatment **layer** and Li metal-protective **layer**)

IT 7704-34-9, Sulfur, uses

RL: DEV (Device component use); USES (Uses)

(cathode; manufacture of lithium-sulfur battery anodes having Li+-conductive pretreatment **layer** and Li metal-protective **layer**)

IT 7440-01-9, Neon, uses 7440-37-1, Argon, uses 7440-59-7, Helium, uses

RL: NUU (Other use, unclassified); USES (Uses)

(inert atmospheric in vapor deposition; manufacture of lithium-sulfur battery anodes having Li+-conductive pretreatment **layer** and Li metal-protective **layer**)

IT 7439-93-2, Lithium, uses

RL: DEV (Device component use); USES (Uses)

(manufacture of lithium-sulfur battery anodes having Li+-conductive pretreatment **layer** and Li metal-protective **layer**)

IT 10377-52-3, Lithium phosphate

RL: DEV (Device component use); USES (Uses)

(pretreatment **layer**; manufacture of lithium-sulfur battery anodes having Li+-conductive pretreatment **layer** and Li metal-protective **layer**)

IT 150499-39-1, Lithium metaphosphate nitride oxide (Li<sub>2.9</sub>(PO<sub>3</sub>)N<sub>0.4600.3</sub>)

RL: DEV (Device component use); USES (Uses)

(protective **layer**; manufacture of lithium-sulfur battery anodes having Li+-conductive pretreatment **layer** and

## Li metal-protective layer)

L18 ANSWER 4 OF 6 HCAPLUS COPYRIGHT 2007 ACS on STN  
 ACCESSION NUMBER: 2003:306576 HCAPLUS Full-text  
 DOCUMENT NUMBER: 139:182767  
 TITLE: Li3PO4:N/LiCoO2 coatings for thin film batteries  
 AUTHOR(S): Gross, M. E.; Martin, P. M.; Stewart, D. C.;  
 Johnston, J. W.; Windisch, C. F.; Graff, G. L.;  
 Rissmiller, P. L.; Dudeck, E. L.  
 CORPORATE SOURCE: Pacific Northwest National Laboratory, Richland,  
 WA, USA  
 SOURCE: Annual Technical Conference Proceedings -  
 Society of Vacuum Coaters (2002), 45th, 119-124  
 CODEN: ATCCDI; ISSN: 0731-1699  
 PUBLISHER: Society of Vacuum Coaters  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English

AB Li3PO4:N (LIPON)/Li1.04CoO2 thin film battery structures were deposited up to 2  $\mu$ m thick were deposited using a 15.2 cm diameter Li2.9PO3.5 pressed powder target for reactive RF magnetron sputtering. Li1.04CoO2 thin films were deposited using a 15.2 cm diameter LiCoO2 pressed powder target. LIPON films were deposited in an ultra pure N2 atmosphere and LiCoO2 films were deposited in an ultra pure atmospheric of Ar + O2. Total chamber pressure during deposition ranged between 5 and 20 mtorr and RF power to the sputtering targets ranged from 100 W to 450 W. Because XPS gave ambiguous compositional results, the films were optimized for a.c. and d.c. conductivity Elec. conductivity was extremely sensitive to deposition conditions, deposition rate, sputtering gas pressure, and reactive gas partial pressure. AC conductivity measurements were made at a frequency of 10 kHz, and were correlated to d.c. conductivity measurements. LIPON films had the highest conductivities in the 660 nS cm<sup>-1</sup> range and the highest a.c. conductivity of Li1.04CoO2 films was .apprx.0.24 S cm<sup>-1</sup>. Earlier work showed the most conductive films were deposited at 20 mtorr pressures and target powers of 100 W. This work has scaled up to conductive films being deposited at 7.5 mtorr pressures and target powers of 400 W. X-ray diffraction anal. showed that the films were mostly amorphous. Films deposited under these conditions were transparent at visible wavelengths with a refractive index of 1.6. Lower conductivity films were brownish in appearance and had less transmission than films with high conductivity The rechargeable battery structure consisting of an alumina substrate, gold current collector, 0.5- $\mu$ m Li1.04CoO2 cathode, 1.2- $\mu$ m LIPON electrolyte, Li metal anode, and a copper current collector are currently under test. Early thin film battery cycle testing was successful, addnl. testing is on-going. Performance results are correlated with film properties and reported. Future work will involve optimization of battery performance on a large scale and scale up of the deposition process to include flexible web processing.

IT 203402-92-0P, Lithium nitride phosphate  
 RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
 (LIPON, sputtered layer; Li3PO4:N/LiCoO2 coatings for thin film secondary batteries)

RN 203402-92-0 HCAPLUS

CN Lithium nitride phosphate (9CI) (CA INDEX NAME)

Component	Ratio	Component
		Registry Number
N	x	17778-88-0
O4P	x	14265-44-2
Li	x	7439-93-2

IT 581094-51-1, Lithium metaphosphate oxide (Li2.9(PO3)O0.5)



RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process)  
(pressed powder target; Li<sub>3</sub>PO<sub>4</sub>:N/LiCoO<sub>2</sub> coatings for thin film secondary batteries)

RN 581094-51-1 HCAPLUS

CN Lithium metaphosphate oxide (Li<sub>2.9</sub>(PO<sub>3</sub>)O<sub>0.5</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
O	0.5	17778-80-2
O3P	1	15389-19-2
Li	2.9	7439-93-2

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 57

IT 203402-92-0P, Lithium nitride phosphate

RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
(LIPON, sputtered **layer**; Li<sub>3</sub>PO<sub>4</sub>:N/LiCoO<sub>2</sub> coatings for thin film secondary batteries)

IT 581094-51-1, Lithium metaphosphate oxide (Li<sub>2.9</sub>(PO<sub>3</sub>)O<sub>0.5</sub>)

RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process)  
(pressed powder target; Li<sub>3</sub>PO<sub>4</sub>:N/LiCoO<sub>2</sub> coatings for thin film secondary batteries)

IT 152829-46-4P, Cobalt lithium oxide (CoLi<sub>1.04</sub>O<sub>2</sub>)

RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
(sputtered **layer**, cathode; Li<sub>3</sub>PO<sub>4</sub>:N/LiCoO<sub>2</sub> coatings for thin film secondary batteries)

REFERENCE COUNT: 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR  
THIS RECORD. ALL CITATIONS AVAILABLE IN  
THE RE FORMAT

L18 ANSWER 5 OF 6 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 2002:925553 HCAPLUS Full-text

DOCUMENT NUMBER: 138:15255

TITLE: Thin solid electrolyte battery

INVENTOR(S): Ito, Shuji; Iwamoto, Kazuya; Ukaji, Masaya;  
Nanai, Norishige; Matsuda, Hiromu; Mino,  
Tatsuji; Honda, Kazuyoshi; Takai, Yoriko

PATENT ASSIGNEE(S): Matsushita Electric Industrial Co., Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 11 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

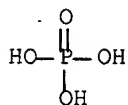
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
-----	----	-----	-----	
JP 2002352850	A	20021206	JP 2001-154955	200105 24
PRIORITY APPLN. INFO.:			JP 2001-154955	200105 24

AB The battery has successive **layers** of a 1st collector, a first active mass, an electrolyte, a 2nd active mass and a 2nd collector connected to elec. conductors; where the **thickness** of the 1st active mass **layer** and the electrolyte **layer** is 1-20 and 1-10  $\mu\text{m}$ , resp. Preferably, the collectors are orthogonal to the conductor, the electrolyte is  $(\text{Li}_2\text{S})_x(\text{SiS}_2)_y(\text{Li}_3\text{PO}_4)_z$  [ $(x+y+z)=1$ ,  $x=0.3-0.8$ ,  $y=0.2-0.7$  and  $z=0.01-0.3$ ], and the 1st or 2nd active mass is  $\text{Li}_3\text{-aMaN}$  ( $0.2 < a < 0.6$ ;  $\text{M} = \text{Co, Ni, Cu and/or Mn}$ ).

IT 10377-52-3, Lithium phosphate ( $\text{Li}_3\text{PO}_4$ ) 477704-33-9  
 , Lithium nitride oxide phosphide ( $\text{Li}_2.9\text{N}_0.46\text{O}_3.3\text{P}$ )  
 RL: DEV (Device component use); USES (Uses)  
 (comps. of solid electrolyte for thin secondary lithium batteries)

RN 10377-52-3 HCAPLUS

CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li

RN 477704-33-9 HCAPLUS

CN Lithium nitride oxide phosphide ( $\text{Li}_2.9\text{N}_0.46\text{O}_3.3\text{P}$ ) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
N	0.46	17778-88-0
O	3.3	17778-80-2
P	1	7723-14-0
Li	2.9	7439-93-2

IC ICM H01M010-36  
 ICS H01M010-36; H01M002-26; H01M002-30; H01M004-02; H01M004-58

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST thin battery solid electrolyte **lithium metal**  
 nitride electrode

IT 10377-51-2, Lithium iodide ( $\text{LiI}$ ) 10377-52-3, Lithium phosphate ( $\text{Li}_3\text{PO}_4$ ) 12136-58-2, Lithium sulfide ( $\text{Li}_2\text{S}$ ) 13759-10-9, Silicon sulfide ( $\text{SiS}_2$ ) 90076-65-6, Lithium bis(trifluoromethanesulfonyl) imide 201471-17-2, Lithium phosphate sulfide thiosilicate ( $\text{Li}_{1.29}(\text{PO}_4)_0.01\text{S}_0.27(\text{SiS}_3)_0.36$ ) 477704-33-9, Lithium nitride oxide phosphide ( $\text{Li}_2.9\text{N}_0.46\text{O}_3.3\text{P}$ )  
 RL: DEV (Device component use); USES (Uses)  
 (comps. of solid electrolyte for thin secondary lithium batteries)

L18 ANSWER 6 OF 6 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 2001:900301 HCAPLUS Full-text

DOCUMENT NUMBER: 136:22000

TITLE: Anode of lithium secondary battery

INVENTOR(S): Kugai, Hirokazu; Ota, Nobuhiro; Yamanaka, Shosaku

PATENT ASSIGNEE(S): Sumitomo Electric Industries, Ltd., Japan  
 SOURCE: Eur. Pat. Appl., 5 pp.  
 CODEN: EPXXDW  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

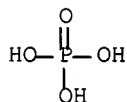
PATENT NO. -----	KIND ----	DATE -----	APPLICATION NO. -----	DATE
EP 1162675	A2	20011212	EP 2001-305020	200106 08
EP 1162675	A3	20040908		
EP 1162675	B1	20061004		
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
JP 2001351615	A	20011221	JP 2000-172073	200006 08
US 2002018939	A1	20020214	US 2001-838182	200104 20
US 6699619	B2	20040302		
PRIORITY APPLN. INFO.:			JP 2000-172073	A 200006 08

AB A lithium-secondary-battery neg. electrode has a protective **layer** to prevent the surface deterioration of the inorg. solid electrolytic **layer**. The neg. electrode comprises metallic lithium or a lithium-containing metal, a first inorg. solid electrolytic **layer** ( **thickness**: a) formed on the metal, and a second inorg. solid electrolytic **layer** (**thickness**: b) formed on the first inorg. solid electrolytic **layer**. The **thickness** ratio b/a is specified to be more than 0.5.

IT 10377-52-3, Lithium phosphate  
 RL: DEV (Device component use); USES (Uses)  
 (anode of lithium secondary battery)

RN 10377-52-3 HCAPLUS

CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li

IC ICM H01M004-02

ICS H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

IT 96-49-1, Ethylene carbonate 108-32-7, Propylene carbonate

7439-93-2, Lithium, uses 7440-50-8, Copper, uses 10377-48-7,

Lithium sulfate 10377-52-3, Lithium phosphate

12136-58-2, Lithium sulfide 12190-79-3, Cobalt lithium oxide

colio2 13453-84-4, Lithium silicate 13759-10-9, Silicon sulfide

sis2 21324-40-3, Lithium hexafluorophosphate 25014-41-9,  
 Polyacrylonitrile 196418-93-6, Lithium phosphate silicide sulfide  
 RL: DEV (Device component use); USES (Uses)  
 (anode of lithium secondary battery)

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L19 ANSWER 1 OF 27 HCAPLUS COPYRIGHT 2007 ACS on STN  
 ACCESSION NUMBER: 2006:337615 HCAPLUS Full-text  
 DOCUMENT NUMBER: 144:394637  
 TITLE: Solid electrolytes based on lithium hafnium  
 phosphate for active metal anode protection  
 INVENTOR(S): Nimon, Yevgeniy S.; De Jonghe, Lutgard C.;  
 Visco, Steven J.  
 PATENT ASSIGNEE(S): Polyplus Battery Company, USA  
 SOURCE: U.S. Pat. Appl. Publ., 16 pp.  
 CODEN: USXXCO  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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US 2006078790	A1	20060413	US 2005-245472	

PRIORITY APPLN. INFO.: US 2004-616325P

200510  
 05  
 200410  
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AB Active metal electrochem. structure, in particular an active metal neg. electrode (anode) protected with an ionically conductive protective architecture incorporating a glassy, ceramic or glass-ceramic solid electrolyte material based on lithium hafnium phosphate, and associated electrochem. devices and methods, provides advantages over conventional structures. The protective architecture prevents the active metal from deleterious reaction with the environment on the other (cathode) side of the architecture, which may include aqueous, air or organic liquid electrolytes and/or electrochem. active materials.

IT 7439-93-2D, Lithium, alloys  
 RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)  
 (active metal electrode; solid electrolytes based on lithium hafnium phosphate for active metal anode protection)

RN 7439-93-2 HCAPLUS  
 CN Lithium (CA INDEX NAME)

Li

IT 7439-93-2, Lithium, uses  
 RL: ANT (Analyte); DEV (Device component use); TEM (Technical or engineered material use); ANST (Analytical study); USES (Uses)  
 (anodes and element in solid electrolyte; solid electrolytes based on lithium hafnium phosphate for active metal

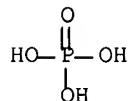
anode protection)  
 RN 7439-93-2 HCAPLUS  
 CN Lithium (CA INDEX NAME)

Li

IT 7439-93-2D, Lithium, inorg. compds. 10377-52-3,  
 Lithium phosphate  
 RL: DEV (Device component use); USES (Uses)  
 (can be in conductive glass or ceramic electrolyte material;  
 solid electrolytes based on lithium hafnium phosphate for active  
**metal** anode protection)  
 RN 7439-93-2 HCAPLUS  
 CN Lithium (CA INDEX NAME)

Li

RN 10377-52-3 HCAPLUS  
 CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li

IT 668998-68-3, Lithium phosphorus nitride oxide (LiPNO)  
 RL: DEV (Device component use); USES (Uses)  
 (contacts anode; solid electrolytes based on lithium hafnium  
 phosphate for active metal anode protection)  
 RN 668998-68-3 HCAPLUS  
 CN Lithium phosphorus nitride oxide (LiPNO) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
N	1	17778-88-0
O	1	17778-80-2
P	1	7723-14-0
Li	1	7439-93-2

INCL 429137000; 429246000; 429303000  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 72  
 ST solid electrolyte **lithium** hafnium phosphate **metal**  
 anode corrosion protection; glass ceramic glassy **lithium**  
**metal** phosphate cathodic protective **layer**  
 IT Materials  
 (layered; solid electrolytes based on lithium hafnium

- phosphate for active metal anode protection)
- IT 7439-93-2D, Lithium, alloys  
 RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)  
 (active metal electrode; solid electrolytes based on lithium hafnium phosphate for active metal anode protection)
- IT 7439-93-2, Lithium, uses  
 RL: ANT (Analyte); DEV (Device component use); TEM (Technical or engineered material use); ANST (Analytical study); USES (Uses)  
 (anodes and element in solid electrolyte; solid electrolytes based on lithium hafnium phosphate for active metal anode protection)
- IT 7439-93-2D, Lithium, inorg. compds. 10377-52-3, Lithium phosphate 12057-24-8, Lithium oxide, uses 13774-56-6  
 RL: DEV (Device component use); USES (Uses)  
 (can be in conductive glass or ceramic electrolyte material; solid electrolytes based on lithium hafnium phosphate for active metal anode protection)
- IT 7550-35-8, Lithium bromide 7789-24-4, Lithium fluoride, uses 10377-51-2, Lithium iodide 12057-29-3, Trilithium phosphide 26134-62-3, Trilithium nitride 668998-68-3, Lithium phosphorus nitride oxide (LiPNO)  
 RL: DEV (Device component use); USES (Uses)  
 (contacts anode; solid electrolytes based on lithium hafnium phosphate for active metal anode protection)

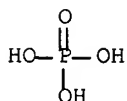
L19 ANSWER 2 OF 27 HCAPLUS COPYRIGHT 2007 ACS on STN  
 ACCESSION NUMBER: 2005:564516 HCAPLUS Full-text  
 DOCUMENT NUMBER: 143:81150  
 TITLE: Chemical protection of a lithium surface  
 INVENTOR(S): De Jonghe, Lutgard; Visco, Steven J.; Nimon, Yevgeniy S.; Sukeshini, A. Mary  
 PATENT ASSIGNEE(S): Polyplus Battery Co., USA  
 SOURCE: U.S., 16 pp.  
 CODEN: USXXAM  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 6911280	B1	20050628	US 2002-327682	20021220
US 2005186469	A1	20050825	US 2005-92781	20050328
PRIORITY APPLN. INFO.:			US 2001-342326P	P 20011221
			US 2002-327682	A1 20021220

AB Disclosed are compns. and methods for alleviating the problem of reaction of lithium or other alkali or alkaline earth metals with incompatible processing and

operating environments by creating a ionically conductive chemical protective layer on the lithium or other reactive metal surface. Such a chemical produced surface layer can protect lithium metal from reacting with oxygen, nitrogen or moisture in ambient atmospheric thereby allowing the lithium material to be handled outside of a controlled atmospheric, such as a dry room. Production processes involving lithium are thereby very considerably simplified. One example of such a process in the processing of lithium to form neg. electrodes for lithium metal batteries.

IT 10377-52-3, Lithium phosphate 184905-46-2, Lithium  
nitrogen phosphorus oxide  
RL: DEV (Device component use); USES (Uses)  
(glass; chemical protection of lithium surface)  
RN 10377-52-3 HCAPLUS  
CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li

RN 184905-46-2 HCAPLUS  
CN Lithium nitrogen phosphorus oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
N	x	17778-88-0
O	x	17778-80-2
P	x	7723-14-0
Li	x	7439-93-2

IC ICM H01M002-08  
ICS H01M010-04; H01M010-26  
INCL 429137000; 429246000; 429231900; 429231950; 429309000; 429319000;  
429320000; 429321000; 429322000; 429126100  
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38, 57  
IT 7440-55-3, Gallium, uses 10377-52-3, Lithium phosphate  
12024-22-5, Gallium sulfide (Ga<sub>2</sub>S<sub>3</sub>) 12025-34-2, Germanium sulfide  
(GeS<sub>2</sub>) 12136-58-2, Lithium sulfide (Li<sub>2</sub>S) 13759-10-9, Silicon  
sulfide (SiS<sub>2</sub>) 184905-46-2, Lithium nitrogen phosphorus  
oxide  
RL: DEV (Device component use); USES (Uses)  
(glass; chemical protection of lithium surface)  
REFERENCE COUNT: 17 THERE ARE 17 CITED REFERENCES AVAILABLE  
FOR THIS RECORD. ALL CITATIONS AVAILABLE  
IN THE RE FORMAT

L19 ANSWER 3 OF 27 HCAPLUS COPYRIGHT 2007 ACS on STN  
ACCESSION NUMBER: 2005:394639 HCAPLUS Full-text  
DOCUMENT NUMBER: 142:449374  
TITLE: Anode for lithium metal  
battery  
INVENTOR(S): Kim, Hee-Tak; Choi, Su-Suk; Choi, Yun-Suk;

PATENT ASSIGNEE(S): Cheon, Sang-Eun; Han, Ji-Seong  
 SOURCE: S. Korea  
 U.S. Pat. Appl. Publ., 16 pp.  
 CODEN: USXXCO  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2005095504	A1	20050505	US 2004-962636	20041011
KR 2005041661	A	20050504	KR 2003-76907	20031031
CN 1612377	A	20050504	CN 2004-10088239	20041021
JP 2005142156	A	20050602	JP 2004-318456	20041101
PRIORITY APPLN. INFO.:			KR 2003-76907	A 20031031

AB The present invention relates to a neg. electrode for a lithium metal battery and a lithium metal battery comprising the same. The neg. electrode of the present invention comprises a neg. active material layer of metallic lithium or a lithium alloy, and a passivation layer formed on the neg. active material layer. The passivation layer has a structure comprising a 3-dimensionally cross-linked polymer network matrix penetrated by linear polymers. The passivation layer formed on the surface of the neg. electrode reduces reactivity of the neg. electrode and stabilizes the surface, so that it offers a lithium metal battery having superior life cycle characteristics.

IT 7439-93-2, Lithium, uses  
 RL: DEV (Device component use); USES (Uses)  
 (anode for lithium metal battery)  
 RN 7439-93-2 HCAPLUS  
 CN Lithium (CA INDEX NAME)

Li

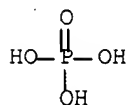
IT 184905-46-2, Lithium nitrogen phosphorus oxide  
 RL: MOA (Modifier or additive use); USES (Uses)  
 (anode for lithium metal battery)  
 RN 184905-46-2 HCAPLUS  
 CN Lithium nitrogen phosphorus oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
N	x	17778-88-0
O	x	17778-80-2
P	x	7723-14-0



Li | x | 7439-93-2

IT 10377-52-3, Lithium phosphate  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (coating film; anode for lithium metal  
 battery)  
 RN 10377-52-3 HCAPLUS  
 CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li

IC ICM H01M002-16  
 ICS B05D003-02  
 INCL 429246000; 429254000; 427388200  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 38  
 ST anode lithium metal battery  
 IT Battery anodes  
 .(anode for lithium metal battery)  
 IT Fluoropolymers, uses  
 Polyacetylenes, uses  
 Polyamides, uses  
 Polycarbonates, uses  
 Polyesters, uses  
 Polyethers, uses  
 Polyimides, uses  
 Polysulfones, uses  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (anode for lithium metal battery)  
 IT Polyacenes  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (coating film; anode for lithium metal  
 battery)  
 IT Coating materials  
 (films; anode for lithium metal battery)  
 IT Secondary batteries  
 (lithium; anode for lithium metal  
 battery)  
 IT Carboxylic acids, uses  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (polycarboxylic acid esters; anode for lithium  
 metal battery)  
 IT Carboxylic acids, uses  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (polycarboxylic, salts; anode for lithium metal  
 battery)  
 IT Polymers, uses  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (polysulfonates; anode for lithium metal  
 battery)  
 IT Lithium alloy, base

RL: DEV (Device component use); USES (Uses)  
 (anode for lithium metal battery)

IT 78-67-1, Azobisisobutyronitrile 80-15-9, Cumyl hydroperoxide  
 94-36-0, Benzoyl peroxide, processes 110-05-4, Di-tert-butyl  
 peroxide 110-22-5, Acetyl peroxide 2895-03-6, Lauryl peroxide  
 13472-08-7, 2,2'-Azobisisovaleronitrile  
 RL: CPS (Chemical process); PEP (Physical, engineering or chemical  
 process); PROC (Process)  
 (anode for lithium metal battery)

IT 111-96-6, Diglyme 7439-93-2, Lithium, uses 10544-50-0,  
 Sulfur S8, uses 90076-65-6  
 RL: DEV (Device component use); USES (Uses)  
 (anode for lithium metal battery)

IT 1344-28-1, Alumina, uses 7631-86-9, Silica, uses 12047-24-4,  
 Barium titanium oxide batiao2 13463-67-7, Titania, uses  
 26134-62-3, Lithium nitride 148522-93-4, Barium oxide (Ba2O3)  
 184905-46-2, Lithium nitrogen phosphorus oxide  
 236388-73-1, Lithium silicide sulfide 236388-74-2, Lithium boride  
 sulfide 851076-32-9, Lithium sulfur oxide  
 RL: MOA (Modifier or additive use); USES (Uses)  
 (anode for lithium metal battery)

IT 75-21-8D, Ethylene oxide, crosslinked polymers containing 9002-86-2,  
 Polyvinyl chloride 9002-88-4, Polyethylene 9002-89-5, Polyvinyl  
 alcohol 9003-07-0, Polypropylene 9003-53-6, Polystyrene  
 13048-33-4D, Hexanediol diacrylate, crosslinked polymers containing  
 24937-79-9, Polyvinylidene fluoride 35465-54-4D, crosslinked  
 polymers containing 91528-71-1  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (anode for lithium metal battery)

IT 7429-90-5, Aluminum, uses 7439-89-6, Iron, uses 7439-92-1, Lead,  
 uses 7439-95-4, Magnesium, uses 7440-21-3, Silicon, uses  
 7440-22-4, Silver, uses 7440-31-5, Tin, uses 7440-42-8, Boron,  
 uses 7440-43-9, Cadmium, uses 7440-48-4, Cobalt, uses  
 7440-50-8, Copper, uses 7440-55-3, Gallium, uses 7440-66-6,  
 Zinc, uses 7440-74-6, Indium, uses 10377-52-3, Lithium  
 phosphate 12627-14-4, Lithium silicate 12676-27-6 25067-58-7,  
 Polyacetylene 25190-62-9, Poly(p-phenylene) 25233-30-1,  
 Polyaniline 25233-34-5, Polythiophene 26009-24-5,  
 Poly(p-phenylene vinylene) 28774-98-3, Poly(2,6-naphthalenediyl)  
 30604-81-0, Polypyrrole 114239-80-4, Poly(perinaphthalene)  
 236388-75-3, Aluminum lithium sulfide 355408-23-0, Lithium nitride  
 phosphide  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (coating film; anode for lithium metal  
 battery)

L19 ANSWER 4 OF 27 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 2005:302682 HCAPLUS Full-text

DOCUMENT NUMBER: 142:376518

TITLE: Energy device and its manufacture

INVENTOR(S): Honda, Kazuyoshi; Okazaki, Sadayuki; Oishi,  
 Koichiro; Takahashi, Makoto; Takai, Yoriko;  
 Higuchi, Hiroshi

PATENT ASSIGNEE(S): Matsushita Electric Industrial Co., Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 18 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2005093373	A	20050407	JP 2003-328628	20030919
PRIORITY APPLN. INFO.:			JP 2003-328628	20030919

AB The device, especially a secondary lithium battery, has a solid electrolyte **layer** and an anode active mass **layer**, containing Li and a 2nd **metal**; where the concentration of Li in the anode active **layer** is increased toward the interface of the electrolyte **layer** side. The device is manufactured by forming the required anode active mass **layer** on the solid electrolyte **layer** by vacuum thin-film process; where the process comprises: using a 1st thin film forming source for laminating Li and a 2nd thin film forming source for laminating the 2nd metal; and forming the anode **layer** by transporting the contribution of the thin-film forming from the 1st thin-film forming by the 1st film forming source to the 2nd thin-film forming by the 2nd film forming source.

IT 7439-93-2, Lithium, uses 168886-50-8, Lithium phosphorus oxide

RL: DEV (Device component use); USES (Uses)  
(structure and manufacture of secondary lithium batteries containing lithium with controlled distribution and other **metals** in anode active mass **layers**)

RN 7439-93-2 HCAPLUS

CN Lithium (CA INDEX NAME)

Li

RN 168886-50-8 HCAPLUS

CN Lithium phosphorus oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
P	x	7723-14-0
Li	x	7439-93-2

IC ICM H01M004-02

ICS C22C024-00; H01M004-38; H01M010-36; H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST secondary lithium battery manuf anode active mass **lithium metal**

IT Secondary batteries

(lithium; structure and manufacture of secondary lithium batteries containing lithium with controlled distribution and other metals in anode active mass **layers**)

IT Battery anodes

(structure and manufacture of secondary lithium batteries containing lithium with controlled distribution and other metals in anode active mass **layers**)

IT 7429-90-5, Aluminum, uses 7439-93-2, Lithium, uses

7440-02-0, Nickel, uses 52627-24-4, Cobalt lithium oxide

168886-50-8, Lithium phosphorus oxide

RL: DEV (Device component use); USES (Uses)

(structure and manufacture of secondary lithium batteries containing lithium with controlled distribution and other metals in anode active mass layers)

L19 ANSWER 5 OF 27 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 2004:1081208 HCAPLUS Full-text

DOCUMENT NUMBER: 142:41556

TITLE: Aliovalent anion protective layers for active metal anodes

INVENTOR(S): De Jonghe, Lutgård; Nimon, Yevgeniy S.; Visco, Steven J.

PATENT ASSIGNEE(S): Polyplus Battery Company, USA

SOURCE: PCT Int. Appl., 37 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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WO 2004109823	A1	20041216	WO 2004-US17646	20040604
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW				
RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
US 2004253510	A1	20041216	US 2004-861336	20040603
EP 1629552	A1	20060301	EP 2004-776270	20040604
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, FI, RO, CY, TR, BG, CZ, EE, HU, PL, SK				
PRIORITY APPLN. INFO.:			US 2003-476143P	P 20030604
			US 2003-482997P	P 20030627
			US 2004-861336	A 20040603
			WO 2004-US17646	W

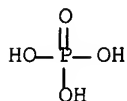
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- AB Active metal anodes can be protected from deleterious reaction and voltage delay in an active metal anode-solid cathode battery cell, and damage to the anode can be significantly reduced or completely alleviated by coating the active **metal** anode (e.g., Li) surface with a thin **layer** of a chemical protective **layer** incorporating aliovalent (multivalent) anions on the **lithium metal** surface. Such an aliovalent surface **layer** is conductive to Li-ions but can protect **lithium metal** from reacting with oxygen, nitrogen or moisture in ambient atmospheric thereby allowing the lithium material to be handled outside of a controlled atmospheric, such as a dry room. Particularly, preferred examples of such protective **layers** include mixts. or solid solns. of lithium phosphate, lithium metaphosphate, and/or lithium sulfate. These protective **layers** can be formed on the Li surface by treatment with diluted solns. of the following acids: H<sub>3</sub>PO<sub>4</sub>, HPO<sub>3</sub> and H<sub>2</sub>SO<sub>4</sub> or their acidic salts in a dry organic solvent compatible with Li by various techniques. Such chemical protection of the Li or other active **metal** electrode significantly enhances active metal electrode protection and reduces the voltage delay due to protected anode's improved stability toward the electrolyte.
- IT 7439-93-2, Lithium, uses  
 RL: DEV (Device component use); USES (Uses)  
 (aliovalent anion protective **layers** for active **metal** anodes)
- RN 7439-93-2 HCAPLUS
- CN Lithium (CA INDEX NAME)

Li

- IT 10377-52-3, Lithium phosphate  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (protective **layer**; aliovalent anion protective **layers** for active metal anodes)
- RN 10377-52-3 HCAPLUS
- CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li

- IC ICM H01M004-04  
 ICS H01M004-02; H01M010-40
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
- ST battery anode aliovalent anion protective **layer** coating
- IT Phosphates, uses  
 Sulfates, uses  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (active metal; aliovalent anion protective **layers** for active metal anodes)
- IT Battery anodes  
 Coating materials

- (aliovalent anion protective **layers** for active metal anodes)
- IT Alkali metals, uses  
Alkaline earth metals  
Oxides (inorganic), uses  
Sulfides, uses  
RL: DEV (Device component use); USES (Uses)  
(aliovalent anion protective **layers** for active metal anodes)
- IT Alloys, uses  
RL: DEV (Device component use); USES (Uses)  
(alkaline earth; aliovalent anion protective **layers** for active metal anodes)
- IT Alloys, uses  
RL: DEV (Device component use); USES (Uses)  
(alkali metal; aliovalent anion protective **layers** for active metal anodes)
- IT Alkali metals, uses  
Alkaline earth metals  
RL: DEV (Device component use); USES (Uses)  
(alloys; aliovalent anion protective **layers** for active metal anodes)
- IT Primary batteries  
Secondary batteries  
(lithium; aliovalent anion protective **layers** for active metal anodes)
- IT Phosphates, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(metaphosphates, active metal; aliovalent anion protective **layers** for active metal anodes)
- IT Halides  
RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PROC (Process)  
(oxyhalides, liquid; aliovalent anion protective **layers** for active metal anodes)
- IT 108-32-7, Propylene carbonate 110-71-4, 1,2-Dimethoxyethane  
1313-13-9, Manganese dioxide, uses 1313-27-5, Molybdenum oxide (MoO<sub>3</sub>), uses 1317-37-9, Iron sulfide (FeS) 1317-38-0, Copper oxide (CuO), uses 1317-40-4, Copper sulfide (CuS)  
7439-93-2, Lithium, uses 7439-95-4, Magnesium, uses  
7440-09-7, Potassium, uses 7440-23-5, Sodium, uses 7440-39-3, Barium, uses 7440-41-7, Beryllium, uses 7440-70-2, Calcium, uses  
7704-34-9, Sulfur, uses 7719-09-7, Thionyl chloride 7784-01-2, Silver chromate 7791-03-9, Lithium perchlorate 11105-02-5, Silver vanadium oxide 12039-13-3, Titanium sulfide (TiS<sub>2</sub>)  
12068-85-8, Iron sulfide (FeS<sub>2</sub>) 14283-07-9, Lithium tetrafluoroborate 15365-14-7, Iron lithium phosphate felipo<sub>4</sub>  
21324-40-3, Lithium hexafluorophosphate 29935-35-1, Lithium hexafluoroarsenate 39300-70-4, Lithium nickel oxide 39457-42-6, Lithium manganese oxide 52627-24-4, Cobalt lithium oxide  
74432-42-1, Lithium polysulfide 90076-65-6, Litfsi  
RL: DEV (Device component use); USES (Uses)  
(aliovalent anion protective **layers** for active metal anodes)
- IT 7664-93-9, Sulfuric acid, uses 13453-86-6, Lithium hydrogen sulfate  
RL: MOA (Modifier or additive use); USES (Uses)  
(aliovalent anion protective **layers** for active metal anodes)
- IT 7664-38-2, Phosphoric acid, uses 10343-62-1, MetaPhosphoric acid

14066-19-4, Hydrogen phosphate, uses 14066-20-7, Dihydrogen phosphate, uses

RL: MOA (Modifier or additive use); USES (Uses)  
(film forming additive; aliovalent anion protective layers for active metal anodes)

IT 10377-48-7, Lithium sulfate 10377-52-3, Lithium phosphate

RL: TEM (Technical or engineered material use); USES (Uses)  
(protective layer; aliovalent anion protective layers for active metal anodes)

REFERENCE COUNT: 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR  
THIS RECORD. ALL CITATIONS AVAILABLE IN  
THE RE FORMAT

L19 ANSWER 6 OF 27 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 2004:1060620 HCAPLUS Full-text

DOCUMENT NUMBER: 142:25936

TITLE: Alleviation of voltage delay in lithium-liquid depolarizer/electrolyte solvent battery cells

INVENTOR(S): De Jonghe, Lutgard; Nimon, Yevgeniy S.; Visco, Steven J.

PATENT ASSIGNEE(S): Polyplus Battery Company, USA

SOURCE: U.S. Pat. Appl. Publ., 12 pp.

CODEN: USXXCO

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2004248009	A1	20041209	US 2003-455259	20030604
WO 2004109826	A2	20041216	WO 2004-US18173	20040603
WO 2004109826	A3	20050224		
W:				
AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW				
RW:				
BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
EP 1629555	A2	20060301	EP 2004-754704	20040603
R:				
AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, FI, RO, CY, TR, BG, CZ, EE, HU, PL, SK				
PRIORITY APPLN. INFO.:			US 2003-455259	A 20030604

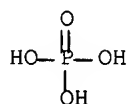
WO 2004-US18173

W

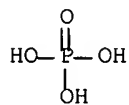
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03

- AB Voltage delay in an active metal anode/liquid cathode battery cell can be significantly reduced or completely alleviated by coating the active **metal** anode (e.g., **Li**) surface with a thin **layer** of an inorg. compound with Li-ion conductivity using chemical treatment of Li surface. Particularly, preferred examples of such compds. include lithium phosphate, lithium metaphosphate, and/or their mixts. or solid solns. with lithium sulfate. These compds. can be formed on the Li surface by treatment with diluted solns. of the following individual acids: H<sub>3</sub>PO<sub>4</sub>, HPO<sub>3</sub> and H<sub>2</sub>SO<sub>4</sub>, their acidic salts, or their binary or ternary mixts. in a dry organic solvent compatible with Li, for instance in 1,2-DME; by various deposition techniques. Such chemical protection of the **Li** or other active **metal** electrode significantly reduces the voltage delay due to protected anode's improved stability toward the electrolyte.
- IT 10377-52-3, Lithium phosphate 13453-80-0, Lithium dihydrogen phosphate 13762-75-9, Lithium metaphosphate 33943-39-4, DiLithium hydrogen phosphate  
 RL: MOA (Modifier or additive use); USES (Uses)  
 (film-forming additive; alleviation of voltage delay in lithium-liquid depolarizer/electrolyte solvent battery cells)
- RN 10377-52-3 HCAPLUS
- CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)

●<sub>3</sub> Li

- RN 13453-80-0 HCAPLUS
- CN Phosphoric acid, lithium salt (1:1) (CA INDEX NAME)



● Li

- RN 13762-75-9 HCAPLUS
- CN Metaphosphoric acid (HPO<sub>3</sub>), lithium salt (8CI, 9CI) (CA INDEX NAME)



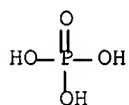
● Li



ONE OR MORE TAUTOMERIC DOUBLE BONDS NOT DISPLAYED IN THE STRUCTURE

RN 33943-39-4 HCAPLUS

CN Phosphoric acid, dilithium salt (8CI, 9CI) (CA INDEX NAME)



●2 Li

IC ICM H01M004-58

ICS H01M006-00; H01M006-18; H01M010-00

INCL 429231600; 429231900; 429231950; 429321000; 429322000; 429323000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 72

IT 7664-38-2, Phosphoric acid, uses 10343-62-1, Metaphosphoric acid

10377-48-7, Lithium sulfate 10377-52-3, Lithium phosphate

13453-80-0, Lithium dihydrogen phosphate 13453-86-6,

Lithium hydrogen sulfate 13762-75-9, Lithium metaphosphate

33943-39-4, DiLithium hydrogen phosphate

RL: MOA (Modifier or additive use); USES (Uses)

(film-forming additive; alleviation of voltage delay in

lithium-liquid depolarizer/electrolyte solvent battery cells)

L19 ANSWER 7 OF 27 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 2004:960418 HCAPLUS Full-text

DOCUMENT NUMBER: 141:382194

TITLE: Cathode containing lithium transition  
metal mixed oxide for secondary  
nonaqueous-electrolyte battery

INVENTOR(S): Hosoya, Yosuke; Yamamoto, Yoshikatsu

PATENT ASSIGNEE(S): Sony Corp., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 15 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
-----	----	-----	-----	
JP 2004319129	A	20041111	JP 2003-108070	200304 11
KR 2004089514	A	20041021	KR 2004-24339	200404 09
US 2004253518	A1	20041216	US 2004-821589	200404 09
CN 1571197	A	20050126	CN 2004-10071490	200404 12

PRIORITY APPLN. INFO.:

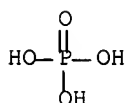
JP 2003-108070

A

200304

11

- AB The claimed cathode active mass contains **layered-structure lithium** transition **metal** mixed oxide particles having a coating containing an inorg. compound and a C material at least a part of their surfaces. The resulting battery provides high electron conductivity and discharge capacity after repeated charging-discharging under high temperature
- IT 10377-52-3, Lithium phosphate (Li<sub>3</sub>PO<sub>4</sub>)  
 RL: MOA (Modifier or additive use); TEM (Technical or engineered material use); USES (Uses)  
 (coating containing inorg. compound and carbon on **lithium** transition **metal** mixed oxide cathode for battery)
- RN 10377-52-3 HCAPLUS
- CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)

●<sub>3</sub> Li

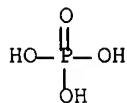
- IC ICM H01M004-58  
 ICS H01M004-02; H01M004-62; H01M010-40
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
- ST **lithium** transition **metal** oxide cathode carbon coating secondary battery
- IT Battery cathodes  
 (coating containing inorg. compound and carbon on **lithium** transition **metal** mixed oxide cathode for battery)
- IT Carbon black, uses  
 RL: MOA (Modifier or additive use); TEM (Technical or engineered material use); USES (Uses)  
 (coating containing inorg. compound and carbon on **lithium** transition **metal** mixed oxide cathode for battery)
- IT Secondary batteries  
 (lithium; coating containing inorg. compound and carbon on **lithium** transition **metal** mixed oxide cathode for battery)
- IT 12031-65-1, Lithium nickel oxide (LiNiO<sub>2</sub>)  
 RL: DEV (Device component use); USES (Uses)  
 (cathode; coating containing inorg. compound and carbon on **lithium** transition **metal** mixed oxide cathode for battery)
- IT 1309-48-4, Magnesia, uses 1344-28-1, Alumina, uses 10377-52-3, Lithium phosphate (Li<sub>3</sub>PO<sub>4</sub>) 12003-67-7, Aluminum lithium oxide (AlLiO<sub>2</sub>) 12031-95-7, Lithium titanium oxide (Li<sub>4</sub>Ti<sub>5</sub>O<sub>12</sub>) 13463-67-7, Titania, uses 15365-14-7, Iron lithium phosphate (FeLiPO<sub>4</sub>)  
 RL: MOA (Modifier or additive use); TEM (Technical or engineered material use); USES (Uses)  
 (coating containing inorg. compound and carbon on **lithium** transition **metal** mixed oxide cathode for battery)

ACCESSION NUMBER: 2004:584868 HCAPLUS Full-text  
 DOCUMENT NUMBER: 141:126310  
 TITLE: Solid secondary lithium batteries showing high  
 charge-discharge current density  
 INVENTOR(S): Kondo, Shigeo; Kurisu, Yasuyuki; Kageyama,  
 Hiroyuki; Takeuchi, Tomonari; Kanno, Ryoji;  
 Inada, Taro  
 PATENT ASSIGNEE(S): Ion Engineering Center Corp., Japan; National  
 Institute of Advanced Industrial Science and  
 Technology  
 SOURCE: Jpn. Kokai Tokkyo Koho, 12 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 2004206942	A	20040722	JP 2002-372272	200212 24
				200212 24

PRIORITY APPLN. INFO.: JP 2002-372272

AB In the batteries, solid electrolytes comprise first low-ionic-conductivity **layers** reactive to Li, and second **layers** unreactive to the first **layers** and preformed on surfaces of Li metal anodes. Preferably, the first **layers** comprise crystalline and/or amorphous Li ion conductive sulfides, and the second **layers** comprise Li ion conductive thin films chosen from Li<sub>3</sub>N, LiI, LiF, SOCl<sub>2</sub>-Li reaction product, Li sulfite, and LiPF<sub>6</sub>.  
 IT 10377-52-3, Lithium phosphate  
 RL: DEV (Device component use); USES (Uses)  
 (glass with Li<sub>2</sub>S and SiS<sub>2</sub>, first solid electrolyte **layer**  
 ; solid secondary lithium batteries using solid electrolytes  
 comprising first low-ionic-conductivity **layers** reactive to Li  
 and second **layers** unreactive to the first  
**layers**)  
 RN 10377-52-3 HCAPLUS  
 CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●<sub>3</sub> Li

IC ICM H01M010-36  
 ICS H01M004-02; H01M004-40; H01M004-62  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 ST two **layer** solid electrolyte lithium battery; battery  
 electrolyte lithium silicon phosphate sulfide glass; lithium nitride  
 solid electrolyte battery

- IT Sulfide glasses  
RL: DEV (Device component use); USES (Uses)  
(lithium silicon phosphate sulfide, first solid electrolyte **layers**; solid secondary lithium batteries using solid electrolytes comprising first low-ionic-conductivity **layers** reactive to Li and second **layers** unreactive to the first **layers**)
- IT Secondary batteries  
(lithium; solid secondary lithium batteries using solid electrolytes comprising first low-ionic-conductivity **layers** reactive to Li and second **layers** unreactive to the first **layers**)
- IT Battery electrolytes  
Solid electrolytes  
(solid secondary lithium batteries using solid electrolytes comprising first low-ionic-conductivity **layers** reactive to Li and second **layers** unreactive to the first **layers**)
- IT 361393-39-7  
RL: DEV (Device component use); USES (Uses)  
(crystalline, first solid electrolyte **layer**; solid secondary lithium batteries using solid electrolytes comprising first low-ionic-conductivity **layers** reactive to Li and second **layers** unreactive to the first **layers**)
- IT 13759-10-9, Silicon sulfide (SiS<sub>2</sub>)  
RL: DEV (Device component use); USES (Uses)  
(glass with Li<sub>2</sub>S and Li<sub>3</sub>PO<sub>4</sub>, first solid electrolyte **layer**; solid secondary lithium batteries using solid electrolytes comprising first low-ionic-conductivity **layers** reactive to Li and second **layers** unreactive to the first **layers**)
- IT 10377-52-3, Lithium phosphate  
RL: DEV (Device component use); USES (Uses)  
(glass with Li<sub>2</sub>S and SiS<sub>2</sub>, first solid electrolyte **layer**; solid secondary lithium batteries using solid electrolytes comprising first low-ionic-conductivity **layers** reactive to Li and second **layers** unreactive to the first **layers**)
- IT 12136-58-2, Lithium sulfide  
RL: DEV (Device component use); USES (Uses)  
(glass with SiS<sub>2</sub> and Li<sub>3</sub>PO<sub>4</sub>, first solid electrolyte **layer**; solid secondary lithium batteries using solid electrolytes comprising first low-ionic-conductivity **layers** reactive to Li and second **layers** unreactive to the first **layers**)
- IT 7439-93-2DP, Lithium, reaction product with thionyl chloride  
7719-09-7DP, Thionyl chloride, reaction product with lithium  
7789-24-4P, Lithium fluoride, uses 10377-51-2P, Lithium iodide  
13308-35-5P 26134-62-3P, Lithium nitride  
RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)  
(second solid electrolyte **layer**; solid secondary lithium batteries using solid electrolytes comprising first low-ionic-conductivity **layers** reactive to Li and second **layers** unreactive to the first **layers**)
- IT 21324-40-3P, Lithium hexafluorophosphate  
RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)  
(solid secondary lithium batteries using solid electrolytes comprising first low-ionic-conductivity **layers** reactive to Li

and second **layers** unreactive to the first **layers**)

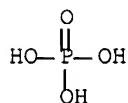
L19 ANSWER 9 OF 27 HCAPLUS COPYRIGHT 2007 ACS on STN  
 ACCESSION NUMBER: 2004:466937 HCAPLUS Full-text  
 DOCUMENT NUMBER: 141:9653  
 TITLE: Negative electrode having lithium ion conductive  
 inorganic compound **layer**, lithium  
 secondary battery with improved cycle  
 characteristic, and manufacture thereof  
 INVENTOR(S): Konishiike, Isamu; Yasuda, Toshikazu; Kubota,  
 Tadahiko  
 PATENT ASSIGNEE(S): Sony Corp., Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 18 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 2004165097	A	20040610	JP 2002-332421	200211 15
PRIORITY APPLN. INFO.:			JP 2002-332421	200211 15

AB Disclosed is the neg. electrode comprising a neg. electrode current collector, a **metal Li layer** formed on the current collector using a dry film forming method, and an inorg. compound **layer** on the **metal Li layer** which has a Li<sup>+</sup> conductivity  $\geq 1 + 10^{-8}$  S/cm at room temperature and is formed in vacuum  $\leq 10$  Pa using a dry film forming method. The use of the inorg. compound **layer** prevented an increase of the internal impedance.

IT 10377-52-3, Lithium phosphate  
 RL: DEV (Device component use); USES (Uses)  
 (neg. electrode having lithium ion conductive inorg. compound **layer** in lithium secondary battery with improved cycle characteristic)

RN 10377-52-3 HCAPLUS  
 CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li

IC ICM H01M004-02  
 ICS H01M004-40; H01M004-64; H01M004-66; H01M010-40  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 ST neg electrode lithium ion secondary battery inorg compd **layer**

IT Secondary batteries  
 (lithium; neg. electrode having lithium ion conductive inorg. compound **layer** in lithium secondary battery with improved cycle characteristic)

IT Battery electrodes  
 (neg. electrode having lithium ion conductive inorg. compound **layer** in lithium secondary battery with improved cycle characteristic)

IT 554-13-2, Lithium carbonate 7439-98-7, Molybdenum, uses 7440-02-0, Nickel, uses 7440-25-7, Tantalum, uses 7440-32-6, Titanium, uses 7440-50-8, Copper, uses 7447-41-8, Lithium chloride, uses 7550-35-8, Lithium bromide 7789-24-4, Lithium fluoride, uses 10102-24-6, Lithium silicate 10377-48-7, Lithium sulfate 10377-51-2, Lithium iodide 10377-52-3, Lithium phosphate 12057-24-8, Lithium oxide, uses 12136-58-2, Lithium sulfide 26134-62-3, Lithium nitride 138709-72-5, Lithium phosphide

RL: DEV (Device component use); USES (Uses)  
 (neg. electrode having lithium ion conductive inorg. compound **layer** in lithium secondary battery with improved cycle characteristic)

L19 ANSWER 10 OF 27 HCAPLUS COPYRIGHT 2007 ACS on STN  
 ACCESSION NUMBER: 2004:310725 HCAPLUS Full-text  
 DOCUMENT NUMBER: 140:324230  
 TITLE: **Lithium metal** anode for  
 lithium battery  
 INVENTOR(S): Cho, Chung-Kun; Lee, Sang-Mock; Lee, Jong-Ki;  
 Kim, Min-Seuk  
 PATENT ASSIGNEE(S): Samsung SDI Co., Ltd., S. Korea  
 SOURCE: U.S. Pat. Appl. Publ., 5 pp.  
 CODEN: USXXCO  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO. -----	KIND ----	DATE -----	APPLICATION NO. -----	DATE
US 2004072066	A1	20040415	US 2003-389752	200303 18
KR 2004035909	A	20040430	KR 2002-62256	200210 12
CN 1489229	A	20040414	CN 2003-120528	200303 13
JP 2004134403	A	20040430	JP 2003-349215	200310 08
JP 3787564	B2	20060621		
PRIORITY APPLN. INFO.:			KR 2002-62256	A 200210 12

AB Provided is a **lithium metal** anode having a **lithium metal layer** and a porous polymer film integrated with a surface of the **lithium metal layer**. The **lithium metal**

anode further includes a current collector attached to the surface of the lithium metal layer opposite the porous polymer film. The lithium metal anode further includes a protective coating layer between the porous polymer film and the lithium metal layer, the protective coating layer having lithium ionic conductivity and impermeable to an electrolyte.

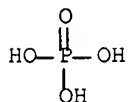
IT 7439-93-2, Lithium, uses 7439-93-2D,  
Lithium, salt 10377-52-3, Lithium  
phosphate 184905-46-2, Lithium nitrogen phosphorus oxide  
RL: DEV (Device component use); USES (Uses)  
(lithium metal anode for lithium  
battery)  
RN 7439-93-2 HCAPLUS  
CN Lithium (CA INDEX NAME)

Li

RN 7439-93-2 HCAPLUS  
CN Lithium (CA INDEX NAME)

Li

RN 10377-52-3 HCAPLUS  
CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li

RN 184905-46-2 HCAPLUS  
CN Lithium nitrogen phosphorus oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
N	x	17778-88-0
O	x	17778-80-2
P	x	7723-14-0
Li	x	7439-93-2

IC ICM H01M002-16  
ICS H01M002-18; H01M004-40; H01M010-04  
INCL 429137000; 429231950; 429246000; 029623200  
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
Section cross-reference(s): 38  
ST lithium metal anode battery  
IT Polyoxyalkylenes, uses,  
Polysiloxanes, uses

- RL: TEM (Technical or engineered material use); USES (Uses)  
(layer; lithium metal anode for lithium battery)
- IT Battery anodes  
Coating materials  
(lithium metal anode for lithium battery)
- IT Fluoropolymers, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(lithium metal anode for lithium battery)
- IT Secondary batteries  
(lithium; lithium metal anode for lithium battery)
- IT Ethers, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(polycyclic, fluoro-; lithium metal anode for lithium battery)
- IT Energy-rich phosphates  
RL: TEM (Technical or engineered material use); USES (Uses)  
(polymers; lithium metal anode for lithium battery)
- IT 7440-02-0, Nickel, uses 7440-50-8, Copper, uses  
RL: DEV (Device component use); USES (Uses)  
(current collector; lithium metal anode for lithium battery)
- IT 9002-88-4, Polyethylene 9003-07-0, Polypropylene  
RL: TEM (Technical or engineered material use); USES (Uses)  
(film; lithium metal anode for lithium battery)
- IT 25322-68-3, Peo 49717-87-5, 2-Propenoic acid, ion(1-) homopolymer, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(layer; lithium metal anode for lithium battery)
- IT 110-71-4 111-96-6, Diglyme 126-33-0, Sulfolane 646-06-0, Dioxolane 7439-93-2, Lithium, uses 7439-93-2D, Lithium, salt 10377-52-3, Lithium phosphate 12627-14-4, Lithium silicate 12676-27-6 26134-62-3, Lithium nitride 33454-82-9, Lithium triflate 37220-89-6, Lithium aluminate 39302-37-9, Lithium titanium oxide 152747-89-2, Lanthanum lithium oxide 184905-46-2, Lithium nitrogen phosphorus oxide 236388-73-1, Lithium silicide sulfide 236388-74-2, Lithium boride sulfide 236388-75-3, Aluminum lithium sulfide 236388-76-4, Lithium phosphide sulfide 342379-43-5, Germanium lithium sulfide  
RL: DEV (Device component use); USES (Uses)  
(lithium metal anode for lithium battery)
- IT 9002-84-0, Ptfе 9011-14-7, Pmma 9011-17-0, Hexafluoropropylene-vinylidene fluoride copolymer 24937-79-9, Pvdф 25014-41-9, Polyacrylonitrile 25067-11-2, Hexafluoropropylene-tetrafluoroethylene copolymer 59947-24-9, Polychlorofluoroethylene  
RL: TEM (Technical or engineered material use); USES (Uses)  
(lithium metal anode for lithium battery)

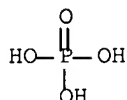


ACCESSION NUMBER: 2003:769061 HCAPLUS Full-text  
 DOCUMENT NUMBER: 139:281311  
 TITLE: Metallization of dental ceramic restorations  
 INVENTOR(S): Prasad, Arun  
 PATENT ASSIGNEE(S): Jeneric/Pentron Incorporated, USA  
 SOURCE: U.S., 5 pp.  
 CODEN: USXXAM  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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US 6627248	B1	20030930	US 2000-710051	200011 10
PRIORITY APPLN. INFO.: US 2000-710051				200011 10

AB A dental restoration comprises a ceramic core material having a thin metallic **layer** disposed on the interior surface of the ceramic core to provide integrity to the ceramic core, eliminate bonding between the ceramic core and the patient's tooth or teeth, and provide an impervious **layer** on the ceramic interior to reduce infiltration of fluids into the ceramic and reduce cracking of the ceramic restoration. The ceramic core material comprises one or more of glass-ceramic, alumina, zirconia, mullite, spinel, porcelain, titania, lithium disilicate, leucite, amorphous glass, and lithium phosphate. The metal in the metal matrix is selected from gold, silver, platinum group metals, titanium, tin, indium, gallium, and antimony. The metallic **layer** may comprise a metal, alloy or metal-matrix ceramic material. A strong, crack-resistant ceramic restoration is provided having highly aesthetic properties.

IT 10377-52-3, Lithium phosphate  
 RL: THU (Therapeutic use); BIOL (Biological study); USES (Uses)  
 (metalization of dental ceramic restorations by  
 electrodeposition of metals and alloys)  
 RN 10377-52-3 HCAPLUS  
 CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●<sub>3</sub> Li

IC ICM A61C013-09  
 INCL 427002260; 427002290; 427205000; 433201100; 433202100  
 CC 63-7 (Pharmaceuticals)  
 Section cross-reference(s): 57  
 IT 1302-34-7, Leucite 1302-67-6, Spinel 1302-93-8, Mullite  
 1314-23-4, Zirconia, biological studies 1344-28-1, Alumina,  
 biological studies 7440-22-4, Silver, biological studies  
 7440-31-5, Tin, biological studies 7440-32-6, Titanium, biological

studies 7440-36-0, Antimony, biological studies 7440-55-3,  
Gallium, biological studies 7440-57-5, Gold, biological studies  
7440-74-6, Indium, biological studies 10102-24-6, Lithium  
silicate 10377-52-3, Lithium phosphate  
13463-67-7, Titania, biological studies

RL: THU (Therapeutic use); BIOL (Biological study); USES (Uses)  
(metalization of dental ceramic restorations by  
electrodeposition of metals and alloys)

REFERENCE COUNT: 35 THERE ARE 35 CITED REFERENCES AVAILABLE  
FOR THIS RECORD. ALL CITATIONS AVAILABLE  
IN THE RE FORMAT

L19 ANSWER 12 OF 27 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 2002:502703 HCAPLUS Full-text

DOCUMENT NUMBER: 137:65723

TITLE: Layered arrangements of lithium anodes  
for batteries

INVENTOR(S): Chu, May-Ying; Visco, Steven J.; Dejonghe,  
Lutgard C.

PATENT ASSIGNEE(S): Polyplus Battery Company, USA

SOURCE: U.S., 25 pp., Cont.-in-part of U.S. Ser. No.  
431,190.

CODEN: USXXAM

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 3

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 6413285	B1	20020702	US 2000-640467	200008 16
US 6413284	B1	20020702	US 1999-431190	199911 01
CA 2387796	A1	20010510	CA 2000-2387796	200010 27
WO 2001033651	A1	20010510	WO 2000-US29732	200010 27
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW				
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
EP 1230694	A1	20020814	EP 2000-973968	200010 27
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL				
BR 2000015111	A	20021126	BR 2000-15111	200010 27

JP 2003529895	T	20031007	JP 2001-535247	200010 27
AU 779944	B2	20050217	AU 2001-12407	200010 27
WO 2002015301	A2	20020221	WO 2001-US24342	200108 02
WO 2002015301	A3	20020926		
WO 2002015301	A9	20030403		
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW				
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
AU 2001081022	A5	20020225	AU 2001-81022	200108 02
US 2002034688	A1	20020321	US 2001-999673	200110 30
US 6737197	B2	20040518		
PRIORITY APPLN. INFO.:			US 1999-431190	A2 199911 01
			US 2000-640467	A 200008 16
			WO 2000-US29732	W 200010 27
			WO 2001-US24342	W 200108 02

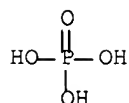
AB A method employing a bonding **layer** is used to form active metal electrodes having barrier **layers**. Active **metals** such as **lithium** are highly reactive in ambient conditions. The method involves fabricating a lithium electrode or other active metal electrode without depositing the barrier **layer** on a **layer** of metal. Rather a smooth barrier **layer** is formed on a smooth substrate such as a web carrier or polymeric electrolyte. A bonding or alloying **layer** is formed on top of the barrier **layer**. Lithium or other active material is then attached to the bonding **layer** to form the active metal electrode. A current collector may also be attached to the **lithium** or active **metal** during the process.

IT 10377-52-3, Lithium phosphate 184905-46-2, Lithium  
nitrogen phosphorus oxide

RL: TEM (Technical or engineered material use); USES (Uses)  
(glass, barrier **layer**; **layered** arrangements  
of lithium anodes for batteries)

RN 10377-52-3 HCAPLUS

CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li

RN 184905-46-2 HCAPLUS

CN Lithium nitrogen phosphorus oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
=====	=====	=====
N	x	17778-88-0
O	x	17778-80-2
P	x	7723-14-0
Li	x	7439-93-2

IC ICM H01M004-04

ICS H01M004-36

INCL 029623400

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST battery lithium anode **layered** arrangement

IT Glass, uses

RL: TEM (Technical or engineered material use); USES (Uses)  
 (barrier **layer**; **layered** arrangements of  
 lithium anodes for batteries)

IT Vapor deposition process  
 (chemical; **layered** arrangements of lithium anodes for  
 batteries)

IT Battery anodes  
 Battery electrolytes  
 Ionic conductivity  
 (**layered** arrangements of lithium anodes for batteries)

IT Polyoxyalkylenes, uses  
 RL: DEV (Device component use); USES (Uses)  
 (**layered** arrangements of lithium anodes for batteries)

IT Polyethers, uses  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (**layered** arrangements of lithium anodes for batteries)

IT Polymer blends  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (**layered** arrangements of lithium anodes for batteries)

IT Polyphosphazenes  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (**layered** arrangements of lithium anodes for batteries)

IT Polythioethers  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (**layered** arrangements of lithium anodes for batteries)

IT Primary batteries  
 (lithium; **layered** arrangements of lithium anodes for  
 batteries)

IT Vapor deposition process  
 (phys.; **layered** arrangements of lithium anodes for  
 batteries)

- IT Imines  
RL: TEM (Technical or engineered material use); USES (Uses)  
(polyimines; **layered** arrangements of lithium anodes for batteries)
- IT Polymers, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(releasable web carrier; **layered** arrangements of lithium anodes for batteries)
- IT Polyesters, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(substrate; **layered** arrangements of lithium anodes for batteries)
- IT Aluminum alloy, base  
RL: TEM (Technical or engineered material use); USES (Uses)  
(foil bonding **layer**; **layered** arrangements of lithium anodes for batteries)
- IT Lithium alloy, base  
RL: TEM (Technical or engineered material use); USES (Uses)  
(**layered** arrangements of lithium anodes for batteries)
- IT 7439-92-1, Lead, uses 7439-93-2, Lithium, uses 7439-95-4, Magnesium, uses 7439-96-5, Manganese, uses 7440-21-3, Silicon, uses 7440-22-4, Silver, uses 7440-32-6, Titanium, uses 7440-36-0, Antimony, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(foil bonding **layer**; **layered** arrangements of lithium anodes for batteries)
- IT 10377-52-3, Lithium phosphate 12627-14-4, Lithium silicate 12676-27-6 37220-89-6, Lithium aluminate 184905-46-2, Lithium nitrogen phosphorus oxide 236388-73-1, Lithium silicide sulfide 236388-74-2, Lithium boride sulfide 236388-75-3, Aluminum lithium sulfide 236388-76-4, Lithium phosphide sulfide  
RL: TEM (Technical or engineered material use); USES (Uses)  
(glass, barrier **layer**; **layered** arrangements of lithium anodes for batteries)
- IT 12798-95-7  
RL: DEV (Device component use); USES (Uses)  
(**layered** arrangements of lithium anodes for batteries)
- IT 12597-68-1, Stainless steel, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(**layered** arrangements of lithium anodes for batteries)
- IT 7429-90-5, Aluminum, uses 7439-89-6, Iron, uses 7440-31-5, Tin, uses 7440-50-8, Copper, uses 7440-66-6, Zinc, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(releasable web carrier; **layered** arrangements of lithium anodes for batteries)
- IT 25038-59-9, Polyethylene terephthalate, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(substrate; **layered** arrangements of lithium anodes for batteries)

REFERENCE COUNT: 28 THERE ARE 28 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

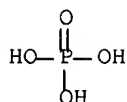
L19 ANSWER 13 OF 27 HCAPLUS COPYRIGHT 2007 ACS on STN  
ACCESSION NUMBER: 2002:143080 HCAPLUS Full-text  
DOCUMENT NUMBER: 136:186681  
TITLE: **Layered** arrangements of lithium anodes for lithium-sulfur batteries  
INVENTOR(S): Chu, May-Ying; Visco, Steven J.; Dejonghe, Lutgard C.

PATENT ASSIGNEE(S): Polyplus Battery Company, USA  
 SOURCE: PCT Int. Appl., 51 pp.  
 CODEN: PIXXD2  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 3  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2002015301	A2	20020221	WO 2001-US24342	20010802
WO 2002015301	A3	20020926		
WO 2002015301	A9	20030403		
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW				
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
US 6413285	B1	20020702	US 2000-640467	20000816
AU 2001081022	A5	20020225	AU 2001-81022	20010802
PRIORITY APPLN. INFO.:				US 2000-640467 A 20000816
				US 1999-431190 A2 19991101
				WO 2001-US24342 W 20010802

AB A method employing a bonding **layer** is used to form active metal electrodes having barrier **layers**. Active **metals** such as **lithium** are highly reactive in ambient conditions. The method involves fabricating a lithium electrode or other active metal electrode without depositing the barrier **layer** on a **layer** of metal. Rather a smooth barrier **layer** is formed on a smooth substrate such as a web carrier or polymeric electrolyte. A bonding or alloying **layer** is formed on top of the barrier **layer**. Lithium or other active material is then attached to the bonding **layer** to form the active metal electrode. A current collector may also be attached to the **lithium** or active **metal** during the process.

IT 10377-52-3, Lithium phosphate 184905-46-2, Lithium nitrogen phosphorus oxide  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (releasable web carrier **layer**; **layered** arrangements of lithium anodes for lithium-sulfur batteries)  
 RN 10377-52-3 HCAPLUS  
 CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li.

RN 184905-46-2 HCAPLUS  
CN Lithium nitrogen phosphorus oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
N	x	17778-88-0
O	x	17778-80-2
P	x	7723-14-0
Li	x	7439-93-2

IC ICM H01M004-00  
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
ST lithium sulfur battery anode **layered** arrangement  
IT Vapor deposition process  
(chemical; **layered** arrangements of lithium anodes for lithium-sulfur batteries)  
IT Battery anodes  
(**layered** arrangements of lithium anodes for lithium-sulfur batteries)  
IT Polyethers, uses  
Polymer blends  
Polyoxyalkylenes, uses  
Polyphosphazenes  
Polythioethers  
RL: DEV (Device component use); USES (Uses)  
(**layered** arrangements of lithium anodes for lithium-sulfur batteries)  
IT Polyesters, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(**layered** arrangements of lithium anodes for lithium-sulfur batteries)  
IT Sulfide glasses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(lithium borosulfide, releasable web carrier **layer**; **layered** arrangements of lithium anodes for lithium-sulfur batteries)  
IT Sulfide glasses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(lithium silicon sulfide, releasable web carrier **layer**; **layered** arrangements of lithium anodes for lithium-sulfur batteries)  
IT Primary batteries  
(lithium; **layered** arrangements of lithium anodes for lithium-sulfur batteries)  
IT Vapor deposition process  
(phys.; **layered** arrangements of lithium anodes for lithium-sulfur batteries)

- IT Imines  
RL: DEV (Device component use); USES (Uses)  
(polyimines; **layered** arrangements of lithium anodes for lithium-sulfur batteries)
- IT Glass, uses  
Polymers, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(releasable web carrier **layer**; **layered** arrangements of lithium anodes for lithium-sulfur batteries)
- IT Aluminum alloy, base  
Titanium alloy, base  
RL: TEM (Technical or engineered material use); USES (Uses)  
(foil bonding **layer**; **layered** arrangements of lithium anodes for lithium-sulfur batteries)
- IT Lithium alloy, base  
RL: DEV (Device component use); USES (Uses)  
(**layered** arrangements of lithium anodes for lithium-sulfur batteries)
- IT 7439-96-5, Manganese, uses 7440-21-3, Silicon, uses 7440-22-4, Silver, uses 7440-36-0, Antimony, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(foil bonding **layer**; **layered** arrangements of lithium anodes for lithium-sulfur batteries)
- IT 7439-93-2, Lithium, uses  
RL: DEV (Device component use); USES (Uses)  
(**layered** arrangements of lithium anodes for lithium-sulfur batteries)
- IT 12798-95-7  
RL: DEV (Device component use); FMU (Formation, unclassified); FORM (Formation, nonpreparative); USES (Uses)  
(**layered** arrangements of lithium anodes for lithium-sulfur batteries)
- IT 25038-59-9, Polyethylene terephthalate, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(**layered** arrangements of lithium anodes for lithium-sulfur batteries)
- IT 7429-90-5, Aluminum, uses 7439-89-6, Iron, uses 7440-31-5, Tin, uses 7440-50-8, Copper, uses 7440-66-6, Zinc, uses 10377-52-3, Lithium phosphate 12627-14-4, Lithium silicate 12676-27-6 37220-89-6, Lithium aluminate 184905-46-2, Lithium nitrogen phosphorus oxide 236388-75-3, Aluminum lithium sulfide 236388-76-4, Lithium phosphide sulfide  
RL: TEM (Technical or engineered material use); USES (Uses)  
(releasable web carrier **layer**; **layered** arrangements of lithium anodes for lithium-sulfur batteries)

L19 ANSWER 14 OF 27 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 2001:717361 HCAPLUS Full-text

DOCUMENT NUMBER: 135:259557

TITLE: Composite materials for sliding parts

INVENTOR(S): Tsutsui, Hideyuki; Egami, Masaki

PATENT ASSIGNEE(S): NTN Corp., Japan

SOURCE: Jpn. Kokai Tokyo Koho, 7 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.

KIND

DATE

APPLICATION NO.

DATE



JP 2001271083

A

20011002

JP 2000-88949

200003

28

PRIORITY APPLN. INFO.:

JP 2000-88949

200003

28

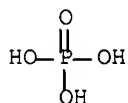
AB The composite materials have a metal substrate, a porous metal **layer** on a the substrate, and a lubricating resin mixture impregnated in the porous **layer**; where resin mixture contains Li<sub>3</sub>PO<sub>4</sub> additive in polytetrafluoroethylene. The mixture may also contain Li<sub>2</sub>CO<sub>3</sub>, p-aramid, and/or aramid containing dispersed SiO<sub>2</sub>.

IT 10377-52-3, Lithium phosphate

RL: TEM (Technical or engineered material use); USES (Uses)  
(**metal** sliding parts with polytetrafluoroethylene-lithium phosphate mixture impregnated porous metal surface **layers**)

RN 10377-52-3 HCAPLUS

CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●<sub>3</sub> Li

IC ICM C10M169-04

ICS C08K003-26; C08K003-32; C08K003-36; C08L027-18; C10M107-38;  
C10M125-10; C10M125-24; C10M125-26; C10M149-18; F16C033-20;  
C10N010-02; C10N010-04; C10N020-06; C10N030-06; C10N040-02

CC 51-8 (Fossil Fuels, Derivatives, and Related Products)

IT Polyamide fibers, uses

RL: TEM (Technical or engineered material use); USES (Uses)  
(aramid, para-; metal sliding parts with polytetrafluoroethylene-lithium phosphate mixture impregnated porous metal surface **layers**)

IT Crystal whiskers

(calcium carbonate; metal sliding parts with polytetrafluoroethylene-lithium phosphate mixture impregnated porous metal surface **layers**)

IT Fluoropolymers, uses

RL: TEM (Technical or engineered material use); USES (Uses)  
(metal sliding parts with polytetrafluoroethylene-lithium phosphate mixture impregnated porous metal surface **layers**)

IT Bearings

(sliding parts with polytetrafluoroethylene-lithium phosphate mixture impregnated porous metal surface **layers** for bearings)

IT 554-13-2, Lithium carbonate 7631-86-9, Silica, uses

9002-84-0, Polytetrafluoroethylene 10377-52-3,

Lithium phosphate 11109-50-5, sus 304

RL: TEM (Technical or engineered material use); USES (Uses)  
(**metal** sliding parts with polytetrafluoroethylene-

lithium phosphate mixture impregnated porous metal surface  
layers)

IT 471-34-1, Calcium carbonate, uses

RL: TEM (Technical or engineered material use); USES (Uses)  
(whiskers; metal sliding parts with polytetrafluoroethylene-  
lithium phosphate mixture impregnated porous metal surface  
layers)

L19 ANSWER 15 OF 27 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 2001:397240 HCAPLUS Full-text

DOCUMENT NUMBER: 135:7792

TITLE: Lithium anodes for electrochemical cells

INVENTOR(S): Skotheim, Terje A.; Sheehan, Christopher J.;  
Mikhaylik, Yuriy V.

PATENT ASSIGNEE(S): Moltech Corporation, USA

SOURCE: PCT Int. Appl., 41 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 3

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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WO 2001039303	A1	20010531	WO 2000-US32234	200011 21
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW				
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
AU 2001017967	A5	20010604	AU 2001-17967	200011 21
EP 1234348	A1	20020828	EP 2000-980746	200011 21
EP 1234348	B1	20031022		
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL				
JP 2003515893	T	20030507	JP 2001-540870	200011 21
CN 1728418	A	20060201	CN 2005-10079023	200011 21
PRIORITY APPLN. INFO.:			US 1999-167171P	P 199911 23
			CN 2000-818169	A3 200011 21

WO 2000-US32234

W

200011

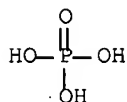
21

AB Provided are lithium anodes for use in electrochem. cells, where the anode active layer has a first layer comprising lithium metal and a second layer of a temporary protective material, wherein the temporary protective material is a metal capable of forming an alloy with lithium metal or is capable of diffusing into lithium metal. The present invention also pertains to methods of forming such anodes, electrochem. cells comprising such anodes, and methods of making such cells.

IT 10377-52-3, Lithium phosphate 184905-46-2, Lithium nitrogen phosphorus oxide  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (lithium anodes for electrochem. cells)

RN 10377-52-3 HCAPLUS

CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li

RN 184905-46-2 HCAPLUS

CN Lithium nitrogen phosphorus oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
N	x	17778-88-0
O	x	17778-80-2
P	x	7723-14-0
Li	x	7439-93-2

IC ICM H01M004-02

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

IT 10377-52-3, Lithium phosphate 11115-95-0, Lithium niobium oxide 12627-14-4, Lithium silicate 12674-25-8, Germanium lithium oxide 17372-42-8 25038-59-9, Polyethylene terephthalate, uses 37220-89-6, Lithium aluminate 152747-89-2, Lanthanum lithium oxide 184905-46-2, Lithium nitrogen phosphorus oxide 236388-73-1, Lithium silicide sulfide 342379-43-5, Germanium lithium sulfide

RL: TEM (Technical or engineered material use); USES (Uses)  
 (lithium anodes for electrochem. cells)

IT 7429-90-5, Aluminum, uses 7439-92-1, Lead, uses 7439-95-4, Magnesium, uses 7440-06-4, Platinum, uses 7440-22-4, Silver, uses 7440-31-5, Tin, uses 7440-43-9, Cadmium, uses 7440-50-8, Copper, uses 7440-55-3, Gallium, uses 7440-56-4, Germanium, uses 7440-57-5, Gold, uses 7440-66-6, Zinc, uses 7440-69-9, Bismuth, uses 7440-74-6, Indium, uses

RL: TEM (Technical or engineered material use); USES (Uses)  
 (temporary protective metal; lithium anodes for electrochem. cells)

REFERENCE COUNT: 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR  
THIS RECORD. ALL CITATIONS AVAILABLE IN  
THE RE FORMAT

L19 ANSWER 16 OF 27 HCAPLUS COPYRIGHT 2007 ACS on STN  
ACCESSION NUMBER: 2001:397239 HCAPLUS Full-text  
DOCUMENT NUMBER: 135:7791  
TITLE: Lithium anodes for electrochemical cells  
INVENTOR(S): Skotheim, Terje A.; Sheehan, Christopher J.;  
Mikhaylik, Yuriy V.; Affinito, John  
PATENT ASSIGNEE(S): Moltech Corporation, USA  
SOURCE: PCT Int. Appl., 39 pp.  
CODEN: PIXXD2  
DOCUMENT TYPE: Patent  
LANGUAGE: English  
FAMILY ACC. NUM. COUNT: 3  
PATENT INFORMATION:

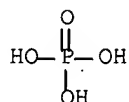
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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WO 2001039302	A1	20010531	WO 2000-US32232	200011 21
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW				
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
AU 2001016286	A5	20010604	AU 2001-16286	200011 21
EP 1236231	A1	20020904	EP 2000-978872	200011 21
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR				
JP 2003515892	T	20030507	JP 2001-540869	200011 21
CN 1728418	A	20060201	CN 2005-10079023	200011 21
PRIORITY APPLN. INFO.:			US 1999-167171P	P 199911 23
			CN 2000-818169	A3 200011 21
			WO 2000-US32232	W 200011 21

AB Provided is an anode for use in electrochem. cells, wherein the anode active layer has a first layer comprising lithium metal and a multi-layer structure comprising single ion conducting layers and crosslinked polymer layers in contact with the first layer comprising lithium metal or in contact with an intermediate protective layer, such as a temporary protective metal layer, or plasma CO2 treatment layers on the surface of the lithium-containing first layer. The anodes of the current invention are particularly useful in electrochem. cells comprising sulfur-containing cathode active materials, such as elemental sulfur.

IT 10377-52-3, Lithium phosphate 184905-46-2, Lithium nitrogen phosphorus oxide  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (glass; lithium anodes for electrochem. cells)

RN 10377-52-3 HCAPLUS

CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li

RN 184905-46-2 HCAPLUS

CN Lithium nitrogen phosphorus oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
N	x	17778-88-0
O	x	17778-80-2
P	x	7723-14-0
Li	x	7439-93-2

IC ICM H01M004-02

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 38

IT 10377-52-3, Lithium phosphate 11115-95-0, Lithium niobium oxide 12627-14-4, Lithium silicate 12676-27-6 12769-51-6, Lithium tantalum oxide 37220-89-6, Lithium aluminate 39302-37-9, Lithium titanium oxide 152747-89-2, Lanthanum lithium oxide 184905-46-2, Lithium nitrogen phosphorus oxide 236388-73-1, Lithium silicide sulfide 236388-74-2, Lithium boride sulfide 236388-75-3, Aluminum lithium sulfide 236388-76-4, Lithium phosphide sulfide 342379-43-5, Germanium lithium sulfide  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (glass; lithium anodes for electrochem. cells)

REFERENCE COUNT: 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L19 ANSWER 17 OF 27 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 2001:359752 HCAPLUS Full-text

DOCUMENT NUMBER: 134:357615

TITLE: Metallization of ceramic restorations

INVENTOR(S): Prasad, Arun

PATENT ASSIGNEE(S): Jeneric/Pentron Incorporated, USA

SOURCE: PCT Int. Appl., 12 pp.  
 CODEN: PIXXD2  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2001034097	A2	20010517	WO 2000-US42044	20001110

WO 2001034097 A3 20011213  
 RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC,  
 NL, PT, SE, TR

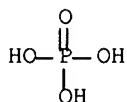
PRIORITY APPLN. INFO.: US 1999-165171P P 19991112

AB A dental restoration comprises a ceramic core material having a thin metallic **layer** disposed on the interior surface of the ceramic core to provide integrity to the ceramic core, eliminate bonding between the ceramic core and the patient's tooth or teeth, and provide an impervious **layer** on the ceramic interior to reduce infiltration of fluids into the ceramic and reduce cracking of the ceramic restoration. The metallic **layer** may comprise a metal, alloy or metal-matrix ceramic material. A strong, crack-resistant ceramic restoration is provided having highly aesthetic properties (no data).

IT 10377-52-3, Lithium phosphate  
 RL: DEV (Device component use); THU (Therapeutic use); BIOL  
 (Biological study); USES (Uses)  
 (metalization of ceramic restorations)

RN 10377-52-3 HCAPLUS

CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li

IC ICM A61K006-00

CC 63-7 (Pharmaceuticals)

IT 1302-67-6, Spinel 1302-93-8, Mullite 1314-23-4, Zirconia,  
 biological studies 1344-28-1, Alumina, biological studies  
 7440-05-3, Palladium, biological studies 7440-06-4, Platinum,  
 biological studies 7440-16-6, Rhodium, biological studies  
 7440-22-4, Silver, biological studies 7440-31-5, Tin, biological  
 studies 7440-32-6, Titanium, biological studies 7440-36-0,  
 Antimony, biological studies 7440-55-3, Gallium, biological  
 studies 7440-57-5, Gold, biological studies 7440-74-6, Indium,  
 biological studies 10102-24-6, Lithium silicate  
 10377-52-3, Lithium phosphate 13463-67-7,  
 Titania, biological studies  
 RL: DEV (Device component use); THU (Therapeutic use); BIOL

(Biological study); USES (Uses)  
(metalization of ceramic restorations)

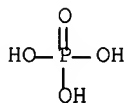
L19 ANSWER 18 OF 27 HCAPLUS COPYRIGHT 2007 ACS on STN  
ACCESSION NUMBER: 2000:725905 HCAPLUS Full-text  
DOCUMENT NUMBER: 133:269464  
TITLE: Battery with an in-situ activation plated  
lithium anode  
INVENTOR(S): Neudecker, Bernd J.; Dudney, Nancy J.; Bates,  
John B.  
PATENT ASSIGNEE(S): Lockheed Martin Energy Research Corp., USA  
SOURCE: PCT Int. Appl., 28 pp.  
CODEN: PIXXD2  
DOCUMENT TYPE: Patent  
LANGUAGE: English  
FAMILY ACC. NUM. COUNT: 1  
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
-----	----	-----	-----	
WO 2000060689	A1	20001012	WO 2000-US6997	200003 17
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM RW: GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
US 6168884	B1	20010102	US 1999-285326	199904 02
PRIORITY APPLN. INFO.:			US 1999-285326	A1 199904 02

AB A thin-film rechargeable battery includes: a cathode film including a lithium transition metal oxide, an electrolyte film coupled to the cathode film, the electrolyte film being substantially nonreactive with oxidizing materials and with metallic lithium, an anode current collector coupled to the electrolyte film; and an overlying layer coupled to the anode current collector. The thin-film rechargeable battery is activated during an initial charge by electrochem. plating of a metallic lithium anode between the anode current collector and the electrolyte film. The plating of the anode during charging and the stripping of the anode layer during discharging are essentially reversible. Therefore, almost no diminishment of discharge capacity occurs, even after many discharge and charge cycles. Other advantages include no need for special packaging for shipping and handling. The battery eliminates the main drawbacks of the thin-film Li-ion battery (high capacity loss during the initial charge) and of the thin-film lithium battery (high air-sensitivity at all times, temperature limited to .apprx.100°, expensive preparation of the lithium anode). The battery survives processing conditions that exceed those of a solder reflow process without any signs of degradation

IT 10377-52-3, Lithiumphosphate  $\text{Li}_3\text{PO}_4$   
RL: DEV (Device component use); USES (Uses)  
(battery with in-situ activation plated lithium anode)

RN 10377-52-3 HCAPLUS  
 CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li

IT 184905-46-2, Lithium nitrogen phosphorus oxide  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (overlying **layer** coupled to anode grid; battery with  
 in-situ activation plated lithium anode)  
 RN 184905-46-2 HCAPLUS  
 CN Lithium nitrogen phosphorus oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
N	x	17778-88-0
O	x	17778-80-2
P	x	7723-14-0
Li	x	7439-93-2

IC ICM H01M010-36  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 IT Fluoropolymers, uses  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (overlying **layer** coupled to anode grid; battery with  
 in-situ activation plated lithium anode)  
 IT 7439-93-2, Lithium, uses 10377-52-3, Lithiumphosphate  
 li3po4 12031-65-1, Lithium nickel oxide linio2 12057-17-9,  
 Lithium manganese oxide limn2o4 12190-79-3, Cobalt lithium oxide  
 colio2  
 RL: DEV (Device component use); USES (Uses)  
 (battery with in-situ activation plated lithium anode)  
 IT 1304-28-5, Barium oxide bao, uses 1304-56-9, Beryllium oxide beo,  
 uses 1305-78-8, Calcium oxide cao, uses 1309-48-4, Magnesia,  
 uses 1312-81-8, Lanthana 1314-11-0, Strontium oxide sro, uses  
 1314-20-1, Thoria, uses 1314-36-9, Yttria, uses 7440-25-7,  
 Tantalum, uses 7440-33-7, Tungsten, uses 7440-41-7, Beryllium,  
 uses 7440-67-7, Zirconium, uses 7447-41-8, Lithium chloride,  
 uses 7550-35-8, Lithium bromide 7631-86-9, Silica, uses  
 7789-24-4, Lithium fluoride, uses 9002-84-0, Ptfе 9002-88-4  
 10043-11-5, Boron nitride bn, uses 10377-51-2, Lithium iodide  
 12033-76-0, Silicon nitride oxide si2n2o 12033-89-5, Silicon  
 nitride, uses 12060-08-1, Scandium oxide sc2o3 12169-03-8,  
 Lithium yttrium oxide liyo2 12209-15-3, Lithium scandium oxide  
 lisco2 12232-41-6, Beryllium lithium oxide be2li2o3 12355-58-7,  
 Aluminum lithium oxide alli5o4 12384-10-0, Lithium zirconium oxide  
 li8zro6 13453-84-4, Lithium silicate li4sio4 24304-00-5,  
 Aluminum nitride 25722-33-2, Parylene 39449-52-0, Lithium  
 silicate li8sio6 56320-64-0, Beryllium lithium oxide (BeLi4O3)  
 57349-02-7, Cerium lithium oxide celio2 184905-46-2,  
 Lithium nitrogen phosphorus oxide



RL: TEM (Technical or engineered material use); USES (Uses)  
 (overlying **layer** coupled to anode grid; battery with  
 in-situ activation plated lithium anode)

REFERENCE COUNT: 9 THERE ARE 9 CITED REFERENCES AVAILABLE FOR  
 THIS RECORD. ALL CITATIONS AVAILABLE IN  
 THE RE FORMAT

L19 ANSWER 19 OF 27 HCAPLUS COPYRIGHT 2007 ACS on STN  
 ACCESSION NUMBER: 2000:454456 HCAPLUS Full-text  
 DOCUMENT NUMBER: 133:61361  
 TITLE: All-solid lithium ion batteries and their  
 manufacture  
 INVENTOR(S): Tomoyose, Ichiji; Roppongi, Yasunobu  
 PATENT ASSIGNEE(S): Trionix K. K., Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 6 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 2000188113	A	20000704	JP 1998-366551	199812 24

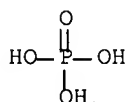
PRIORITY APPLN. INFO.: JP 1998-366551  
 199812  
 24

AB Batteries with the solid electrolyte **layer**, manufactured from vapor deposition sources comprising of powders of Li compds. and **metal** oxides and/or sulfides, are claimed. The solid electrolyte **layer** is manufactured using vapor deposition sources made by heat pressing of (A) mixts. of powders of Li compds. and **metal** oxides and/or sulfides or (B) powder ceramics containing Li compds. and **metal** oxides and/or sulfides. Very thin batteries with high ion conductivity are manufactured

IT 10377-52-3, Lithium phosphate  
 RL: PEP (Physical, engineering or chemical process); PROC (Process)  
 (manufacture of all-solid lithium ion batteries by formation of  
 electrolyte **layer** by vapor deposition)

RN 10377-52-3 HCAPLUS

CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li

IC ICM H01M006-18  
 ICS C04B035-00; C23C014-34  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 IT Battery electrolytes

(films; manufacture of all-solid lithium ion batteries by formation of electrolyte **layer** by vapor deposition)

IT Vapor deposition process

(manufacture of all-solid lithium ion batteries by formation of electrolyte **layer** by vapor deposition)

IT 1344-28-1, Alumina, processes 10377-52-3, Lithium phosphate 13463-67-7, Titania, processes

RL: PEP (Physical, engineering or chemical process); PROC (Process)  
(manufacture of all-solid lithium ion batteries by formation of electrolyte **layer** by vapor deposition)

L19 ANSWER 20 OF 27 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 2000:113026 HCAPLUS Full-text

DOCUMENT NUMBER: 132:125362

TITLE: Protective coatings for battery anodes

INVENTOR(S): Visco, Steven J.; Chu, May-Ying

PATENT ASSIGNEE(S): Polyplus Battery Company, Inc., USA

SOURCE: U.S., 18 pp., Cont.-in-part of U.S. 5,789,108.

CODEN: USXXAM

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 15

PATENT INFORMATION:

PATENT NO. -----	KIND ----	DATE -----	APPLICATION NO. -----	DATE
US 6025094	A	20000215	US 1998-86665	199805 29
US 5523179	A	19960604	US 1994-344384	199411 23
US 5582623	A	19961210	US 1995-479687	199506 07
US 5686201	A	19971111	US 1996-686609	199607 26
US 5789108	A	19980804	US 1997-814927	199703 11
US 2001041294	A1	20011115	US 2001-901970	200107 09
US 6723140	B2	20040420		
PRIORITY APPLN. INFO.:			US 1994-344384	A2 199411 23
			US 1995-479687	A2 199506 07
			US 1996-686609	A2 199607 26
			US 1997-814927	A2 199703

11

US 1998-86665

A

199805

29

US 1998-139601

A

199808

25

US 1998-139603

A1

199808

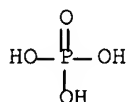
25

AB Disclosed is an alkali metal neg. electrode having a protective **layer**. Specifically, the disclosed neg. electrode includes a glassy or amorphous surface protective **layer** which conducts alkali metal ions but effectively blocks the alkali metal in the electrode from direct contact with the ambient. The protective **layer** has improved smoothness and reduced internal stress in comparison to prior protective **layers** such as those formed by sputtering. In a specific embodiment, the protective **layer** is formed on the **lithium metal** electrode surface by a plasma assisted deposition technique.

IT 10377-52-3, Lithium phosphate  $\text{Li}_3\text{PO}_4$  184905-46-2, Lithium nitrogen phosphorus oxide  
 RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)  
 (protective coatings for battery anodes)

RN 10377-52-3 HCAPLUS

CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li

RN 184905-46-2 HCAPLUS

CN Lithium nitrogen phosphorus oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
N	x	17778-88-0
O	x	17778-80-2
P	x	7723-14-0
Li	x	7439-93-2

IC ICM H01M004-58

INCL 429231950

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

IT 554-13-2, Lithium carbonate 1303-86-2, Boron oxide  $\text{B}_2\text{O}_3$ , uses  
 1314-80-3, Phosphorus pentasulfide 7631-86-9, Silica, uses  
 10377-51-2, Lithium iodide 10377-52-3, Lithium phosphate  
 $\text{Li}_3\text{PO}_4$  12057-24-8, Lithia, uses 12627-14-4, Lithium silicate  
 12676-27-6 26134-62-3, Lithium nitride 37220-89-6, Lithium

aluminate 184905-46-2, Lithium nitrogen phosphorus oxide  
 236388-73-1, Lithium silicide sulfide 236388-74-2, Lithium boride  
 sulfide 236388-75-3, Aluminum lithium sulfide 236388-76-4,  
 Lithium phosphide sulfide  
 RL: DEV (Device component use); TEM (Technical or engineered  
 material use); USES (Uses)

(protective coatings for battery anodes)

REFERENCE COUNT: 17 THERE ARE 17 CITED REFERENCES AVAILABLE  
 FOR THIS RECORD. ALL CITATIONS AVAILABLE  
 IN THE RE FORMAT

L19 ANSWER 21 OF 27 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 1999:723300 HCAPLUS Full-text

DOCUMENT NUMBER: 131:312496

TITLE: Encapsulated lithium electrodes having glass  
 protective **layers** and method for their  
 preparation

INVENTOR(S): Visco, Steve J.; Tsang, Floris Y.

PATENT ASSIGNEE(S): Polyplus Battery Company, Inc., USA

SOURCE: PCT Int. Appl., 33 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 15

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 9957770	A1	19991111	WO 1999-US6895	199903 29
W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW RW: GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
US 6214061	B1	20010410	US 1998-139601	199808 25
CA 2330293	A1	19991111	CA 1999-2330293	199903 29
AU 9933713	A	19991123	AU 1999-33713	199903 29
AU 745287	B2	20020321		
EP 1093672	A1	20010425	EP 1999-915119	199903 29
EP 1093672	B1	20040825		
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
BR 9910109	A	20011009	BR 1999-10109	199903 29
JP 2002513991	T	20020514	JP 2000-547661	

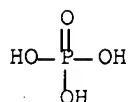
AT 274752 T 20040915 AT 1999-915119 199903  
 29  
 US 6432584 B1 20020813 US 2000-678063 199903  
 29  
 PRIORITY APPLN. INFO.: US 1998-83947P P 200010  
 02  
 US 1998-139601 A 199805  
 01  
 US 1998-139601 A 199808  
 25  
 WO 1999-US6895 W 199903  
 29

AB A method for fabricating an active **metal** electrode involves depositing **lithium** or other active **metal** electrode on a protective **layer**. The protective **layer** is a glassy or amorphous material that conducts ions of the active metal. It may be deposited on a releasable web carrier or other substrate such as polymer electrolyte **layer**. Lithium is then deposited on the protective **layer**. Finally, a current collector is attached to the lithium.

IT 10377-52-3, Lithium phosphate 184905-46-2, Lithium nitrogen phosphorus oxide  
 RL: DEV (Device component use); USES (Uses)  
 (protective **layer** containing; encapsulated lithium electrodes having glass protective **layers** and method for their preparation)

RN 10377-52-3 HCAPLUS

CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li

RN 184905-46-2 HCAPLUS

CN Lithium nitrogen phosphorus oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
N	x	17778-88-0
O	x	17778-80-2
P	x	7723-14-0
Li	x	7439-93-2

IC ICM H01M004-02

ICS H01M004-04; H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

Section cross-reference(s): 38

- IT Secondary batteries  
(Li-S; encapsulated lithium electrodes having glass protective layers and method for their preparation)
- IT Battery anodes  
Encapsulation  
Polymer electrolytes  
(encapsulated lithium electrodes having glass protective layers and method for their preparation)
- IT Polyethers, uses  
Polymers, uses  
Polyphosphazenes  
Polythioethers  
RL: DEV (Device component use); USES (Uses)  
(gel electrolyte containing; encapsulated lithium electrodes having glass protective layers and method for their preparation)
- IT Polyoxyalkylenes, uses  
RL: DEV (Device component use); USES (Uses)  
(gel or solid electrolyte containing; encapsulated lithium electrodes having glass protective layers and method for their preparation)
- IT Battery electrolytes  
(gel; encapsulated lithium electrodes having glass protective layers and method for their preparation)
- IT Imines  
RL: DEV (Device component use); USES (Uses)  
(polyimines, gel electrolyte containing; encapsulated lithium electrodes having glass protective layers and method for their preparation)
- IT 7440-02-0, Nickel, uses 12597-68-1, Stainless steel, uses  
RL: DEV (Device component use); USES (Uses)  
(current collector; encapsulated lithium electrodes having glass protective layers and method for their preparation)
- IT 7439-93-2, Lithium, uses  
RL: DEV (Device component use); USES (Uses)  
(encapsulated lithium electrodes having glass protective layers and method for their preparation)
- IT 10377-52-3, Lithium phosphate 12627-14-4, Lithium silicate 12676-27-6 37220-89-6, Lithium aluminate 184905-46-2, Lithium nitrogen phosphorus oxide 236388-73-1, Lithium silicide sulfide 236388-74-2, Lithium boride sulfide 236388-75-3, Aluminum Lithium sulfide 236388-76-4, Lithium phosphide sulfide  
RL: DEV (Device component use); USES (Uses)  
(protective layer containing; encapsulated lithium electrodes having glass protective layers and method for their preparation)
- IT 7429-90-5, Aluminum, uses 7439-89-6, Iron, uses 7440-31-5, Tin, uses 7440-50-8, Copper, uses 7440-66-6, Zinc, uses  
RL: TEM (Technical or engineered material use); USES (Uses)  
(releasable web carrier; encapsulated lithium electrodes having glass protective layers and method for their preparation)

REFERENCE COUNT: 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L19 ANSWER 22 OF 27 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 1999:549496 HCAPLUS Full-text

DOCUMENT NUMBER: 131:146969

TITLE: Plating metal anodes under protective coatings for use in batteries

INVENTOR(S): Chu, May-Ming; Visco, Steven J.; De Jonghe, Lutgard C.  
 PATENT ASSIGNEE(S): Polyplus Battery Company, Inc., USA  
 SOURCE: PCT Int. Appl., 40 pp.  
 CODEN: PIXXD2  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 15  
 PATENT INFORMATION:

PATENT NO. -----	KIND ----	DATE -----	APPLICATION NO. -----	DATE
WO 9943034	A1	19990826	WO 1999-US3335	199902 17
W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW RW: GH, GM, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
US 6402795	B1	20020611	US 1998-139603	199808 25
CA 2322131	A1	19990826	CA 1999-2322131	199902 17
AU 9932959	A	19990906	AU 1999-32959	199902 17
AU 743685	B2	20020131		
BR 9908010	A	20001024	BR 1999-8010	199902 17
EP 1057222	A1	20001206	EP 1999-934368	199902 17
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, LV, FI				
JP 2002504741	T	20020212	JP 2000-532875	199902 17
PRIORITY APPLN. INFO.:				US 1998-75017P P
				199802 18
				US 1998-139603 A
				199808 25
				WO 1999-US3335 W
				199902 17

AB A method for forming lithium electrodes having protective **layers** involves plating lithium between a lithium ion conductive protective **layer** and a current collector of an electrode precursor. The electrode precursor is formed by depositing the

protective **layer** on a very smooth surface of a current collector. The protective **layer** is a glass such as lithium phosphorus oxynitride and the current collector is a conductive sheet such as a copper sheet. During plating, lithium ions move through the protective **layer** and a lithium metal **layer** plates onto the surface of the current collector. The resulting structure is a protected lithium electrode. To facilitate uniform lithium plating, the electrode precursor may include a wetting **layer** which coats the current collector.

IT 7439-93-2, Lithium, uses

RL: DEV (Device component use); FMU (Formation, unclassified); FORM (Formation, nonpreparative); USES (Uses)  
(plating **metal** anodes under protective coatings for use in batteries)

RN 7439-93-2 HCAPLUS

CN Lithium (CA INDEX NAME)

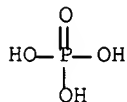
Li

IT 10377-52-3, Lithium phosphate 184905-46-2, Lithium nitrogen phosphorus oxide

RL: TEM (Technical or engineered material use); USES (Uses)  
(protective **layer**; plating metal anodes under protective coatings for use in batteries)

RN 10377-52-3 HCAPLUS

CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li

RN 184905-46-2 HCAPLUS

CN Lithium nitrogen phosphorus oxide (CA INDEX NAME)

Component	Ratio	Component
		Registry Number
N	x	17778-88-0
O	x	17778-80-2
P	x	7723-14-0
Li	x	7439-93-2

IC ICM H01M004-04

ICS H01M004-12; H01M010-36; H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

IT Primary batteries

Secondary batteries

(lithium; plating **metal** anodes under protective coatings for use in batteries)

IT 7429-90-5, Aluminum, uses 7439-92-1, Lead, uses 7439-95-4, Magnesium, uses 7440-21-3, Silicon, uses 7440-22-4, Silver, uses 7440-31-5, Tin, uses 7440-44-0, Carbon, uses 11126-12-8, Iron



sulfide 12673-92-6, Titanium sulfide  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (anode precursor, wetting **layer** material; plating metal  
 anodes under protective coatings for use in batteries)

IT 7439-93-2, Lithium, uses

RL: DEV (Device component use); FMU (Formation, unclassified); FORM  
 (Formation, nonpreparative); USES (Uses)  
 (plating **metal** anodes under protective coatings for use  
 in batteries)

IT 74432-42-1, Lithium polysulfide 236388-74-2,  
 Lithium boride sulfide 236388-76-4, Lithium  
 phosphide sulfide

RL: TEM (Technical or engineered material use); USES (Uses)  
 (plating **metal** anodes under protective coatings for use  
 in batteries)

IT 10377-52-3, Lithium phosphate 12627-14-4, Lithium silicate  
 12676-27-6 37220-89-6, Lithium aluminate 184905-46-2,  
 Lithium nitrogen phosphorus oxide 236388-73-1, Lithium silicide  
 sulfide 236388-75-3, Aluminum lithium sulfide

RL: TEM (Technical or engineered material use); USES (Uses)  
 (protective **layer**; plating metal anodes under  
 protective coatings for use in batteries)

REFERENCE COUNT: 6 THERE ARE 6 CITED REFERENCES AVAILABLE FOR  
 THIS RECORD. ALL CITATIONS AVAILABLE IN  
 THE RE FORMAT

L19 ANSWER 23 OF 27 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 1999:147847 HCAPLUS Full-text

DOCUMENT NUMBER: 130:170658

TITLE: Electrode-electrolyte unit and its production  
 and use in thin-film battery and electrochromic  
 device

INVENTOR(S): Weppner, Werner; Birke, Peter

PATENT ASSIGNEE(S): Germany

SOURCE: Ger. Offen., 14 pp.

CODEN: GWXXBX

DOCUMENT TYPE: Patent

LANGUAGE: German

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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DE 19735803	A1	19990225	DE 1997-19735803	199708 18

DE 19735803 B4 20061019

PRIORITY APPLN. INFO.:

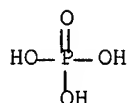
DE 1997-19735803

199708  
18

AB The unit includes an electrode of a conducting ions-forming element, such as Li, and a transition **metal**-containing oxide, sulfide, nitride, fluoride, chloride, and/or carbide; or an alloy of a conducting ion-forming element; and an electrolyte of a conducting ions-forming element, such as Li, and a main group element- and/or transition metal-containing oxide, sulfide, nitride, fluoride, and/or chloride. The fabrication efficiency and the elec. properties of the unit can be improved by providing a conducting ions-conducting intermediate **layer** between the electrode and the electrolyte and/or by simultaneous insertion of the

conducting ions-forming element into the cathode material and by oxidizing the electrolyte by closing and outer plasma-including current circuit.

IT 10377-52-3P, Trilithium phosphate  
 RL: DEV (Device component use); PNU (Preparation, unclassified);  
 PREP (Preparation); USES (Uses)  
 (in electrode-electrolyte unit for use in thin-film battery and electrochromic device)  
 RN 10377-52-3 HCAPLUS  
 CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li

IT 184905-46-2, Lithium nitrogen phosphorus oxide  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (in electrode-electrolyte unit for use in thin-film battery and electrochromic device)  
 RN 184905-46-2 HCAPLUS  
 CN Lithium nitrogen phosphorus oxide (CA INDEX NAME)

Component	Ratio	Component Registry Number
N	x	17778-88-0
O	x	17778-80-2
P	x	7723-14-0
Li	x	7439-93-2

IC ICM H01M010-02  
 ICS C23C016-50; G09F009-35; G02F001-153  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 Section cross-reference(s): 74  
 IT 1314-35-8DP, Tungsten oxide (WO<sub>3</sub>), lithiated, uses  
 10377-52-3P, Trilithium phosphate 12031-66-2P, Lithium  
 tantalum oxide (LiTaO<sub>3</sub>) 52627-24-4P, Cobalt lithium oxide  
 RL: DEV (Device component use); PNU (Preparation, unclassified);  
 PREP (Preparation); USES (Uses)  
 (in electrode-electrolyte unit for use in thin-film battery and electrochromic device)  
 IT 17372-42-8 184905-46-2, Lithium nitrogen phosphorus oxide  
 RL: TEM (Technical or engineered material use); USES (Uses)  
 (in electrode-electrolyte unit for use in thin-film battery and electrochromic device)

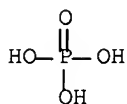
L19 ANSWER 24 OF 27 HCAPLUS COPYRIGHT 2007 ACS on STN  
 ACCESSION NUMBER: 1998:463093 HCAPLUS Full-text  
 DOCUMENT NUMBER: 129:183350  
 TITLE: Crystal structure and cation transport  
 properties of the **layered**  
 monodiphosphates: Li<sub>9</sub>M<sub>3</sub>(P<sub>2</sub>O<sub>7</sub>)<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub> (M = Al,  
 Ga, Cr, Fe)  
 AUTHOR(S): Poisson, S.; D'yvoire, F.; Guyen-Huy-Dung, N.;

Bretey, E.; Berthet, P.  
 CORPORATE SOURCE: Laboratoire de Chimie des Solides, URA-CNRS 446,  
 Universite Paris-Sud, Orsay, 91405, Fr.  
 SOURCE: Journal of Solid State Chemistry (1998), 138(1),  
 32-40  
 CODEN: JSSCBI; ISSN: 0022-4596  
 PUBLISHER: Academic Press  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English

AB Isotypic monodiphosphates  $\text{Li}_9\text{M}_3(\text{P}_2\text{O}_7)_3(\text{PO}_4)_2$  ( $\text{M} = \text{Al}, \text{Ga}, \text{Cr}, \text{Fe}$ ) were synthesized by flux methods. The crystal structure of the Al and Fe members is described here. They crystallize in the trigonal space group  $\text{P}6_3/\text{mmc}$  with  $a = 9.553(1)$ ,  $c = 13.492(2)$  Å ( $\text{M} = \text{Al}$ ),  $a = 9.726(1)$ ,  $c = 13.615(2)$  Å ( $\text{M} = \text{Fe}$ ) and  $Z = 2$ . The structure consists of  $\infty^2[(\text{MP}_2\text{O}_7)_3(\text{PO}_4)_2]_9^-$  corrugated layers, parallel to (001), separated by Li ions. The layers are built up of  $\text{MO}_6$  octahedra sharing corners with  $\text{PO}_4$  tetrahedra and  $\text{P}_2\text{O}_7$  groups. Three nonequivalent Li ions are present according to the structural formula  $\text{Li}(1)\text{Li}(2)\text{Li}(3)_6[\text{MP}(2)\text{O}_7]_3[\text{P}(1)\text{O}_4]_2$ . The crystals exhibit a Li ion conduction mainly parallel to (001) but with rather low conductivity values:  $\sigma_{\parallel}(001) = 1.3 \times 10^{-4}$  and  $3.0 \times 10^{-6} \Omega^{-1} \text{cm}^{-1}$  at  $300^\circ$  for  $\text{M} = \text{Fe}$  and  $\text{M} = \text{Al}$ , resp. In the presence of acidic aqueous solns.,  $\text{Li}_9\text{Fe}_3(\text{P}_2\text{O}_7)_3(\text{PO}_4)_2$  undergoes an ion-exchange reaction between  $\text{Li}^+$  and  $\text{H}^+$  with the introduction of  $\text{H}_2\text{O}$  mols., which causes a 1-dimensional expansion of the crystals perpendicular to the layers. (c) 1998 Academic Press.

IT 10377-52-3, Trilithium phosphate  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (for preparation of lithium metal phosphate pyrophosphates)

RN 10377-52-3 HCAPLUS  
 CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



● 3 Li

CC 78-6 (Inorganic Chemicals and Reactions)  
 Section cross-reference(s): 75, 76

ST lithium double phosphate diphosphate prepn; crystal structure  
 lithium double phosphate diphosphate; structure lithium aluminum  
 iron phosphate diphosphate; aluminum lithium phosphate diphosphate  
 prepn structure; iron lithium phosphate diphosphate prepn structure;  
 elec cond lithium metal phosphate diphosphate;  
 gallium lithium phosphate diphosphate prepn; chromium lithium  
 phosphate diphosphate prepn

IT 1308-38-9, Chromium sesquioxide, reactions 1309-37-1, Ferric  
 oxide, reactions 1344-28-1, Alumina, reactions 7722-76-1,  
 Ammonium dihydrogen phosphate 10377-52-3, Trilithium  
 phosphate 12024-21-4, Gallium sesquioxide  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (for preparation of lithium metal phosphate pyrophosphates)

REFERENCE COUNT: 33 THERE ARE 33 CITED REFERENCES AVAILABLE  
 FOR THIS RECORD. ALL CITATIONS AVAILABLE  
 IN THE RE FORMAT

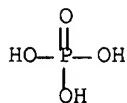
L19 ANSWER 25 OF 27 HCAPLUS COPYRIGHT 2007 ACS on STN  
 ACCESSION NUMBER: 1996:472923 HCAPLUS Full-text  
 DOCUMENT NUMBER: 125:119497  
 TITLE: Secondary nonaqueous-electrolyte lithium  
 batteries with improved cathodes  
 INVENTOR(S): Fujiwara, Masafumi; Yamada, Shuji; Oosaki,  
 Takahisa  
 PATENT ASSIGNEE(S): Tokyo Shibaura Electric Co, Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 14 pp.  
 CODEN: JKXXAF  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO. -----	KIND ----	DATE -----	APPLICATION NO. -----	DATE
JP 08138670	A	19960531	JP 1994-277513	199411 11
JP 3195175	B2	20010806	JP 1994-277513	199411 11
PRIORITY APPLN. INFO.:				

AB The batteries use cathodes from LiNiO<sub>2</sub> containing alkali **metals** other than Li, alkaline earth **metals**, transition metals other than Ni, group III, IV, V, and/or chalcogens at least on the surface, and having coatings containing higher amts. of the metals than the bulk, and preferably sp. surface area 0.5-2 m<sup>2</sup>/g. The metals may have a specified Pauling electronegativity.

IT 10377-52-3, Lithium phosphate  
 RL: PEP (Physical, engineering or chemical process); PROC (Process)  
 (in prepn of cathodes from lithium nickel oxide having high-metal surface **layer**)

RN 10377-52-3 HCAPLUS  
 CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li

IC ICM H01M004-58  
 ICS H01M004-02; H01M010-40  
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
 IT Alkali **metals**, uses  
 Alkaline earth **metals**  
 Group IIIB elements  
 Group IVB elements  
 Group VB elements  
 Group VIA elements  
 RL: MOA (Modifier or additive use); USES (Uses)

(cathodes from lithium nickel oxide having high-metal surface layer)

IT Cathodes

(battery, from lithium nickel oxide having high-metal surface layer)

IT 7429-90-5, Aluminum, uses 7439-89-6, Iron, uses 7439-96-5, Manganese, uses 7440-21-3, Silicon, uses 7440-42-8, Boron, uses 7440-48-4, Cobalt, uses 7440-55-3, Gallium, uses 7440-66-6, Zinc, uses 7704-34-9, Sulfur, uses 7723-14-0, Phosphorus, uses RL: MOA (Modifier or additive use); USES (Uses)

(cathodes from lithium nickel oxide having high-metal surface layer)

IT 12031-65-1, Lithium nickel oxide (LiNiO<sub>2</sub>)

RL: DEV (Device component use); PRP (Properties); USES (Uses)

(cathodes having high-metal surface layer)

IT 1309-33-7, Iron hydroxide [Fe(OH)<sub>3</sub>] 1310-65-2, Lithium hydroxide 10377-48-7, Lithium sulfate 10377-52-3, Lithium phosphate 10377-66-9, Manganese nitrate 12007-60-2, Lithium borate (Li<sub>2</sub>B<sub>4</sub>O<sub>7</sub>) 13494-91-2, Gallium sulfate [Ga<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>] 20427-58-1, Zinc hydroxide 21041-93-0, Cobalt hydroxide [Co(OH)<sub>2</sub>] 21645-51-2, Aluminum hydroxide, processes 82867-86-5

RL: PEP (Physical, engineering or chemical process); PROC (Process) (in prepn of cathodes from lithium nickel oxide having high-metal surface layer)

L19 ANSWER 26 OF 27 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 1987:217007 HCAPLUS Full-text

DOCUMENT NUMBER: 106:217007

TITLE: Solid-state batteries

INVENTOR(S): Mizuno, Yasuo; Kondo, Shigeo

PATENT ASSIGNEE(S): Matsushita Electric Industrial Co., Ltd., Japan

SOURCE: Jpn. Kokai Tokkyo Koho, 3 pp.

CODEN: JKXXAF

DOCUMENT TYPE: Patent

LANGUAGE: Japanese

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

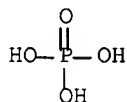
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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JP 61263068	A	19861121	JP 1985-105110	198505 17
PRIORITY APPLN. INFO.:				JP 1985-105110
				198505 17

AB The batteries use Li ion-conducting solid electrolyte and Li -intercalated transition metal oxide anodes having a solid electrolyte layer on the side opposite to the battery electrolyte. A substrate was successively deposited with a Ni-20% Cr cathode collector, a 1- $\mu$  WO<sub>3</sub> cathode, a LiTaO<sub>3</sub> electrolyte layer, a 1- $\mu$  WO<sub>3</sub> layer, a Ni anode collector, and a LiTaO<sub>3</sub> layer. The composite was immersed in 1M LiClO<sub>4</sub> in propylene carbonate, and the WO<sub>3</sub> layer was short-circuited with a Li piece for 5 h to intercalate the layer with Li to form an anode. After drying, the battery was coated with epoxy resin. The battery showed an open-circuit voltage of 2.5 V, and the capacity decreased 10% after 100 charging-discharging cycles at 5  $\mu$ A/cm<sup>2</sup>. Intercalation of the anode by this method is safer than vacuum deposition.

IT 7439-93-2, uses and miscellaneous  
RL: USES (Uses)  
(anodes from transition **metal** oxide intercalated with,  
for solid-state batteries)  
RN 7439-93-2 HCAPLUS  
CN Lithium (CA INDEX NAME)

Li

IT 10377-52-3  
RL: USES (Uses)  
(electrolytes, lithium anodes with backside coatings of, for  
solid state batteries)  
RN 10377-52-3 HCAPLUS  
CN Phosphoric acid, lithium salt (1:3) (CA INDEX NAME)



●3 Li

IC ICM H01M010-36  
ICS H01M006-18  
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)  
IT Anodes  
(battery, lithium-intercalated transition **metal**  
oxide, manufacture of)  
IT 7439-93-2, uses and miscellaneous  
RL: USES (Uses)  
(anodes from transition **metal** oxide intercalated with,  
for solid-state batteries)  
IT 10377-52-3 12031-66-2 13453-84-4 15138-76-8  
RL: USES (Uses)  
(electrolytes, lithium anodes with backside coatings of, for  
solid state batteries)

L19 ANSWER 27 OF 27 HCAPLUS COPYRIGHT 2007 ACS on STN  
ACCESSION NUMBER: 1987:199239 HCAPLUS Full-text  
DOCUMENT NUMBER: 106:199239  
TITLE: Secondary nonaqueous batteries  
INVENTOR(S): Mizuno, Yasuo; Kondo, Shigeo  
PATENT ASSIGNEE(S): Matsushita Electric Industrial Co., Ltd., Japan  
SOURCE: Jpn. Kokai Tokkyo Koho, 4 pp.  
CODEN: JKXXAF  
DOCUMENT TYPE: Patent  
LANGUAGE: Japanese  
FAMILY ACC. NUM. COUNT: 1  
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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